

TRENDS

LIBRARY

Library Resource Sharing Networks

Peter Webster, Issue Editor

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Library Trends, a quarterly thematic journal, focuses on current trends in all areas of library practice. Each issue addresses a single theme in depth, exploring topics of interest primarily to practicing librarians and information scientists and secondarily to educators and students.

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CONTENTS

Introduction <i>Peter Webster</i>	343
EDEN: A Web-Based Model for Electronic Document Exchange <i>John Durno</i>	346
Consortia in Europe: Describing the Various Solutions through Four Country Examples <i>Kristiina Hormia-Poutanen, Claudine Xenidou-Dervou, Rima Kupryte, Kari Stange, Alexander Kuznetsov, Hazel Woodward</i>	359
Interconnected and Innovative Libraries: Factors Tying Libraries More Closely Together <i>Peter Webster</i>	382
More Bang for the Buck: Increasing the Effectiveness of Library Expenditures through Cooperation <i>David F. Kohl, Tom Sanville</i>	394
Closing the 95 Percent Gap: Library Resource Sharing for People with Print Disabilities <i>Mary Anne Epp</i>	411
The Online Computer Library Center's Open WorldCat Program <i>Chip Nilges</i>	430

Perspectives on Building Consortia Between Libraries and Other Agencies <i>Dian Borek, Brian Bell, Gail Richardson, Walter Lewis</i>	448
Knowledge-Sharing Activities in India <i>N. Laxman Rao</i>	463

Introduction

PETER WEBSTER

Cooperation and sharing of resources have always had an important role in libraries, particularly since the development of modern systematized libraries. Many of our basic practices, cataloging, and classification methods were developed to bring a uniform and common order to our collections of information. Cooperation is deeply ingrained in library culture. Libraries and librarians participate in an astonishing array of organizations at all levels of practice. We share resources of many kinds—library materials but also metadata, computer resources, best practices, and expertise—in a rapidly growing variety of alliances and groupings. Our cooperative networks are both formal and informal; local, state, and regional; and increasingly national and international.

Library Trends last considered issues of library cooperation and resource sharing in volume 45, number 3, in the winter of 1997. There have been many important developments related to this far-reaching topic since then. This issue explores the theme that through cooperation, aided by technology, libraries are being bound ever more closely together. They are increasingly becoming nodes in a common information network. The issue takes a broad approach in order to explore many diverse aspects of library sharing and cooperation and the many ways in which libraries are working more closely together.

I have provided a summary of some of the factors drawing libraries together. These include the benefits of sharing new technology, new and increasingly detailed information interchange standards, and informal software and programming standards. New Web-based centralized resources for sharing library holdings and indexing information are rapidly developing. New widely shared services like virtual reference are also emerging. New partnerships—between libraries, between information companies, and

between vendors and libraries and other organizations—are also bringing information services together in a variety of new ways.

David Kohl and Tom Sanville provide a look at the impact of shared e-content licensing and high-speed document delivery in academic libraries. Based on experience in the OhioLINK libraries, they provide an assessment of the major service benefits as well as cost benefits of materials sharing. David Kohl is building on the article that he contributed to the last issue of *Library Trends* to consider this topic.

Dian Borek, Brian Bell, Gail Richardson, and Walter Lewis discuss the cooperative online service called the Ontario School Curriculum Resource (OSCR). They apply their substantial experience to issues surrounding cooperative efforts between different types of libraries and with other organizations. They use developments in Ontario and Canadian libraries to look at what is possible for digital information partnerships if the organizational, funding, and other challenges can be overcome. John Durno focuses on the EDEN project to develop a new electronic document exchange (EDE) standard. He discusses issues surrounding the standards libraries use for online document sharing, and he describes the need for new and more advanced standards. Mary Anne Epp explores cooperative library efforts in one important specialized area: the provision of services and materials for people with print disabilities. She looks at the existing library networks and services for blind and print disabled users in Canada, the UK, and the United States. But she also looks at the issues that still need to be addressed by libraries working collectively in their own countries and internationally.

Library resource sharing is international and truly global. Our literature often does not provide enough information about the development of library services outside of North America. Therefore, contributions covering library cooperative efforts in Europe and Asia are included. Kristiina Hormia-Poutanen and co-authors Claudine Xenidou-Dervou, Rima Kupryte, Kari Stange, Alexander Kuznetsov, and Hazel Woodward have provided an insightful look at the development of library consortium services at both the national and international levels in Finland, the United Kingdom, Russia, and Greece. The discussion of these four countries provides a valuable look at some of the advances being made and issues being encountered in library collaboration and networking in Europe. N. Laxman Rao provides a similarly far-reaching discussion of the development of cooperative and consortium services for libraries in India. He offers an account of the special problems faced by library services in a developing country and looks at how those problems are being addressed.

The Online Computer Library Center (OCLC) Open WorldCat project is an important centralized service that is now making library holdings information accessible worldwide via Internet search engines like Google

and Yahoo. Chip Nilges presents the research leading to the introduction of this new service. He looks at the thinking behind the service, as well as its development, current operation, and future possibilities.

In this diverse group of articles several themes emerge repeatedly. Partnerships and alliances are a common focus, from formal, nationally mandated and funded consortia, to special purpose partnerships, to informal and ad hoc relationships. The importance of standards comes up in many different contexts. Shared and open software development also comes up several times. Shared centralized resources, from worldwide services to local projects, are another repeated theme.

Each of the articles in some way supports the idea that many important next steps forward in library service cannot be taken alone by individual libraries; they can only be achieved in broad consort. Often regional, national, or even global concerted action is necessary to achieve the advances in our services that are possible.

Peter Webster is Systems Librarian for Saint Mary's University in Halifax, Canada. He is also a participant in the Nova Scotia academic library consortium NOVANET, as well as regional and Canadian national resource-sharing efforts. Peter received his MLS from Dalhousie University in 1986. He has been a speaker at CLA, APLA, ALA, and ACCESS conferences. His recent publications include "Breaking Down Information Silos: Integrating Online Information," *Online* 28, no. 6; "Metasearching in an Academic Environment," *Online* 28, no. 2; and "Remote Patron Validation: Posting a Proxy Server at the Digital Doorway," *Computers in Libraries* 22, no. 8.

EDEN: A Web-Based Model for Electronic Document Exchange

JOHN DURNO

ABSTRACT

The advantages of Web-based document exchange between libraries are just beginning to be systematically explored. This article focuses on general considerations in the development of a Web-based model for electronic document exchange (EDE) in the context of the OpenILL Cooperative's EDEN project. These include an overview of the existing document delivery standard (GEDI) and its relationship to emerging models and a discussion of factors being considered in the development of a Web-based protocol, including document exchange format, application event sequencing, meta-data, and security.

INTRODUCTION

The spread of the Web and its associated hypertext transfer protocol (HTTP) have all but eliminated the technical difficulties associated with moving computer files from one place to another. For a variety of reasons, however, library document delivery networks do not currently take full advantage of HTTP, relying instead on the earlier file transfer protocol (FTP) for the interchange of documents between sites. HTTP, when it is used at all, tends to be employed in the final stage of the document delivery process, delivering content to end-users.

The advantages of Web-based document delivery to end-users have been widely discussed and documented (Schnell, 2000; Sayeed, Murray, & Wheeler, 2001). The advantages of Web-based document exchange between libraries are just beginning to be systematically explored. Atlas Systems has announced that its Odyssey document delivery software is being designed around a new open, Web-based protocol. And the OpenILL Cooperative's

EDEN (Electronic Document Exchange Network) project is focused on building an open source implementation of Web-based document exchange to work in conjunction with its open source interlibrary loan (ILL) management system. At the time of writing, neither project has yet published its protocol specification (although both may now be available).

This article focuses on general considerations in the development of a Web-based model for electronic document exchange (EDE). These include an overview of the existing document delivery standard (GEDI) and its relationship to emerging models and a discussion of factors being considered in the development of a testbed for the EDEN project, including document exchange format, application event sequencing, metadata, and security.

The term "document delivery" can be used to cover a wide range of activities. In this context I am using the phrase "document delivery network" to refer to a group of libraries capable of exchanging documents over the Internet and capable of receiving documents from commercial suppliers. It makes sense as well to limit the concept of "document delivery" to documents that are not directly accessible to end-users in print or electronically; typically this includes documents neither owned nor licensed by the user's library or documents that are unavailable on the public Web.

EXISTING TECHNOLOGIES AND STANDARDS

Library document delivery networks typically rely on the use of specialized software created specifically for the purpose of streamlining the digitization and Internet transmission of print documents. Infotrieve's Ariel software (formerly developed by the Research Libraries Group [RLG]) is by far the dominant player in this niche, and it is sometimes referred to as the "de facto standard" for document exchange between libraries (Franke-Webb, 2001). Consequently, it is common to define a "document delivery network" as a set of distributed workstations intercommunicating via Ariel or Ariel-type software.

A de facto standard is of course not a formal standard. Part of the reason that libraries have been slow to embrace a Web-based model for electronic document exchange has been that the de facto standard, Ariel, is built around a formal standard, GEDI (Generic Electronic Document Interchange, ISO 17933), that was finalized in the very early days of the Web. The first version of the GEDI standard dates from 1991, when the Web consisted of a handful of experimental nodes (Berners-Lee et al., 1994). Consequently, HTTP would have been on nobody's radar screen when the standard was being worked out. There have been two subsequent versions of GEDI, in 1995 and 2000. The 2000 version permitted an alternate transfer protocol (email) and alternate file formats (PDF and JFIF [JPEG]). HTTP was not mentioned (International Organization for Standardization, 2000).

GEDI specified a standard file transfer protocol (initially FTAM, later FTP), a standard file interchange format (TIFF), and a standard format for metadata (the GEDI document header). Metadata was included as an SGML header prepended to the TIFF document, containing origin and destination information, document interchange format, and document description.

The GEDI standard was created to solve a particular problem: achieving interoperability between document delivery networks. In the late 1980s and early 1990s a number of separate agencies in Europe and North America were developing systems for electronic document exchange. As the number of agencies and networks increased, it was recognized that the development of incompatible systems would create a "Tower of Babel" impeding document exchange between disparate document delivery networks. These disparate networks were conceptualized as "domains" in the original GEDI Recommendation (Braid, 1994). GEDI was never intended to be a universal standard but rather a means of exchanging documents between domains. It was assumed that alternative means of transmitting and encoding documents would still be employed within individual domains; GEDI compliance was only needed to ensure interoperability between them (Braid, 1994).

As an example, the French FOUORE domain at the time used STUDEL as its file transfer protocol while the British JANET used x.400 (email) for file transfer. The GEDI standard was proposed as a means of enabling document exchange despite these fundamentally different architectures by using the GEDI file transfer protocol as a bridge. A GEDI relay on the British side would receive documents via x.400 and forward them via the GEDI file transfer protocol to a relay on the French side. The French relay would then forward documents via STUDEL to their destination points (Braid, 1994).

As one of the agencies participating in the development of GEDI, RLG incorporated the standard into the design of its Ariel workstations in the early 1990s. Today's Ariel workstations send and receive documents formatted to comply with an updated version of the standard. However, Ariel's implementation of the GEDI standard does not conform to the original purpose of the standard as outlined above. Ariel implements GEDI primarily as an exchange format between proprietary workstations, not as a means of achieving interoperability between disparate systems or networks.

LIMITATIONS OF THE GEDI STANDARD

The persistence of the GEDI standard fifteen years after its initial conception may be interpreted as a testament to the fundamental soundness of its design. In fact, the standard reflects a number of good design decisions, notably its simplicity, its separation of metadata from the document body, and its integration with related International Organization for Standardization (ISO) ILL standards. However, the GEDI standard imposes limitations

on the design of document exchange networks and restricts their ability to make optimal use of current technologies.

The use of FTP for file transfer requires the presence of an FTP server on both the sending and receiving sides of the transaction. While installing an FTP server is not rocket science, adding an FTP server to a network generally requires the involvement of systems staff and may not be practical for smaller libraries with limited IT capabilities. In addition, FTP does not implement modern security protocols. FTP is widely regarded as insecure. Email was added as an alternative transfer protocol in an updated version of the standard; however, email systems often have policies (notably limits on the size of incoming attachments) that make them impractical for receiving large documents. (VanBuskirk & Caouette, 2000, p. 115)

The use of TIFF (and later PDF and JPEG) as the file format reflects the assumption that the documents libraries want to exchange are exclusively static and visual: journal articles and book chapters consisting primarily of text but also containing nontextual elements such as photographs, diagrams, and charts. In the past this was probably a safe assumption, but there is no reason to assume this will continue to be the case. With the proliferation of sound and moving image file formats, and the ever increasing availability of bandwidth and computer memory, it is inevitable that some of the documents libraries will wish to exchange will not fit comfortably into the current paradigm (Baker, 2002).

Another limitation of the GEDI standard is the assumption that a document can be represented as a single file or a collection of discrete files. For newer hybrid media that is likely not to be the case. A new standard should leave open the possibility of documents consisting of multiple, interrelated files.

THE EDEN PROJECT

The goal of the EDEN project is to develop an open protocol for Web-based electronic document exchange (Leggott, 2005). It is an outgrowth of the OpenILL project to develop an open source ISO-compliant ILL system, spearheaded by the University of Winnipeg in partnership with a coalition of academic libraries in western Canada. The testbed EDEN system is being designed to integrate with OpenILL using a plug-in, modular architecture that will enable stand-alone implementations of the software.

The document delivery transaction exists within the larger context of interlibrary lending, which has been formalized according to the ISO standards 10160 and 10161 (ISO ILL). Although the EDEN protocol will be designed to integrate with ISO ILL technologies, the goal is to design a protocol that will complement but not require ISO ILL (OpenILL Cooperative, 2003).

As noted above, EDEN is not the only project seeking to develop a Web-based document exchange protocol. Atlas Systems, developers of Odyssey document delivery software, has also announced the forthcoming publication of an open protocol for Web-based document exchange (the specification had not been released at the time of writing). Concerns that these separate but related projects will lead to the development of incompatible systems are probably premature. While the ultimate goal of any standard is widespread adoption in its application domain, a diversity of approaches in the early stages of development should allow for the emergence of a "best-of-breed" technology as the advantages of each are evaluated. As Tim Bray, co-author of the XML 1.0 specification, has noted, "a good standard is what happens when an industry has basically shaken the bugs out of a technology and then, after the fact, writes it down" (Bray, 2003). In any case, the independent emergence of similar projects indicates widespread interest in moving to a Web-based model and may be considered a strong predictor of further development in this area.

Details of the EDEN protocol will be worked out in the context of developing and implementing the testbed, reflecting Gordon Bell's assertion that "standards should be based on real experience, not on committee designs" (Bell, 2004, p. 73). If a working implementation is a precondition to a good standard, a specification is a precondition to a good implementation. To that end, the EDEN project will develop its specification through a process of broad consultation, soliciting feedback from as many stakeholders as wish to be involved. Development of the specification and the resulting implementation will be iterative, on the principle that deployment, testing, and feedback will undoubtedly necessitate changes to the original design. Successive versions of the testbed implementation will be released under an open source license to encourage wide participation in the project.

Adopting an iterative approach increases the likelihood of arriving at a result that is well fitted for its intended use. It also means that details of the implementation are likely to diverge in development from the model outlined below, which represents an initial pass at identifying the design requirements of the EDEN testbed.

RATIONALE

Before proceeding further, it may be worthwhile to take a step backward and ask why we need a protocol at all. As we have seen, the GEDI protocol was developed primarily as a means of conveying documents across disparate networks. At the time it was developed there were several competing file transfer protocols, and it was by no means obvious which of them, if any, would achieve dominance. In fact, it was by no means clear that TCP/IP, the underlying protocol supporting Internet protocols like FTP and HTTP, would achieve the ubiquity that it has (Hafner & Lyon, 1996).

In the balkanized networking environment of the early 1990s the GEDI model made sense. However, it is by now safe to assume that everyone with an Internet connection has the means to access documents via HTTP. Is a protocol for electronic document exchange still necessary? The answer is yes, but at least partly for reasons other than those for which GEDI was created. The purpose of developing an EDE protocol in the present day is not to enable document transmission across networks but to facilitate the exchange of documents between libraries in a controlled and systematic way. In the context of library interlending, a new EDE protocol must be designed to integrate as seamlessly as possible with library business processes and workflows and the ILL management systems and protocols supporting them. The goal of the protocol is to create system efficiencies for libraries on both the sending and receiving sides of the transaction or, more precisely, to enable developers to build systems to achieve that end.

Even if we agree that an open protocol is required to enable developers of different document delivery systems to intercommunicate, is the library-to-library transaction model still valid? It is possible to imagine a world in which suppliers would deliver documents directly to end-users with no need for the requesting agency to act as the intermediary. This is happening to some degree already. Perhaps this is the future we should be moving toward, rather than staying with the library-to-library model.

The EDEN initiative is predicated on the assumption that a library-to-library model is still required, even if direct delivery is an option. There are several reasons why direct delivery may not always be the optimal approach. These include the following:

- Privacy: users may not wish to have their contact information made available to third-party suppliers
- Convenience: the client library may wish to make all requested documents available through a central service point, whether that is the library circulation desk or its Web portal
- Law: some jurisdictions prohibit direct delivery of digitized content to end-users; the library is required to print it first
- Accountability: the client library may wish to confirm that requested documents have in fact been received
- Responsibility: serving the user is the client library's role, not the supplier's. Some suppliers may not be willing to serve another library's clientele, particularly if it means storing unclaimed documents on their server for extended periods of time

REQUIREMENTS

It is important to distinguish between a protocol and its implementations. Protocols dictate the behavior of systems to a degree, but systems

with widely varying capabilities can be built on top of the same protocol. Successful widespread adoption of a protocol depends in part on its relative simplicity and the degree to which it can be implemented using common and widely available technologies.

Design of the protocol must also reflect a consideration of the diverse contexts in which it is likely to be implemented. The scale of a given library's interlending operations to a large extent determines its business processes. Achieving system efficiencies may mean something very different in the context of a small branch library than it does in the context of a large university ILL department. The latter has a strong incentive to build and maintain complex systems to help staff manage workflow; the former may find the volume of documents to be processed is not large enough to warrant it. The protocol must permit both low-volume and high-volume implementations.

In the context of the ubiquitous Web, using HTTP as the transfer protocol for EDE makes sense. However, in itself moving to HTTP does not require the development of a new protocol. As noted above, the GEDI standard has already been updated twice with the addition of alternative transfer protocols (FTP and email). If the goal is to move to HTTP transport, perhaps the simplest way to achieve this would be to update the existing standard rather than developing a new one. However, the goal is not simply to move to a new transport protocol; the goal is to streamline document exchange between libraries. HTTP is only part of the picture.

As noted by Chari and Seshadri (2004), achieving interoperability between applications involves multiple levels:

- Transport, which handles the movement of data between applications
- Data format, which ensures consistency of data representation between applications
- Process, which coordinates the sequencing of events between applications

The GEDI standard covers two of these layers—transport and data format—which are referred to as “Interchange Mechanism” and “Electronic Document Format” within the standard.

GEDI does not specify “process”—the sequencing of events that must occur between the document supplier and receiver at the time of document transmission. This is key to establishing a truly open protocol. If third-party developers cannot predict sequencing, interoperability may and very likely will require customized event handling for every preexisting implementation. It may even require a formal agreement between the developers of different systems. The new protocol will cover all three levels required to achieve true interoperability between document delivery systems, representing a true and important departure from its predecessor.

WEB SERVICES

The decision to use HTTP as the transport protocol for EDE reflects the prevailing trend in the broader information technology (IT) community to employ Web Services to achieve interoperability between systems. This decision is in part strategic, reflecting the requirement that developers should be able to construct implementations using widely available technologies. The broader IT community is much bigger than the library IT community; it makes sense to adapt existing technologies wherever possible rather than building our systems from scratch.

Web Services support interactions with other “software systems . . . using XML based messages conveyed by Internet protocols” (W3C Web Services Architecture Working Group, 2004, chap. 1.1). XML messaging is an efficient platform- and language-independent way to exchange messages between applications. The technologies required to build Web Services applications are readily and often freely available: Web servers and clients, XML processing libraries, and programming toolkits have been developed for many platforms. Web Services are commonly seen as the foundation of the new generation of B2B (Business-to-Business) software applications; it follows that Web Services will likely be useful in the context of developing L2L (Library-to-Library) applications, of which EDE is one.

TESTBED ARCHITECTURE

Interchange is only one component of the complete document delivery cycle. Other components include discovery, ordering, digitization, printing, and administration (billing). Integrated document delivery applications typically handle several of these components.

A modular architecture is seen as key to developing a successful testbed implementation of Web-based EDE. Existing document delivery software often merges the separate facets of the document delivery transaction into a single application: scanning, applying metadata, document transmission, reception, and processing are all handled by the same program. While this architecture may be an effective design for handling library workflow, it will be more useful in the present instance to disaggregate these functions in order to focus as much as possible on document transmission, the core of the EDE protocol. The testbed application will develop only those functions necessary to prototype Web-based document exchange.

A modular architecture may be useful in a production environment as well. Separating the document transmission and scanning modules would enable them to reside on separate machines, which could have advantages for enhancing both security and efficiency. For example, a document scanning module could be installed on a machine within an organization’s firewall, while the transmission module could reside on the organization’s Web server. In fact, this architecture would permit the transmission module

to be installed on a third-party network, which could be a boon to smaller sites operating within a consortium, multibranch public libraries, and multi-campus schools. One installation could serve multiple libraries.

FILE EXCHANGE FORMAT

GEDI specified a standard file format for document exchange. As noted above, the format consisted of a binary image file (TIFF, PDF, or JPEG) accompanied by metadata in the form of a prepended header. The header and binary image file together constituted a new file type, requiring specialized software to process them. A GEDI-formatted PDF is typically no longer readable by applications designed for the purpose, such as Adobe Acrobat Reader. This constitutes another limitation of the GEDI standard: the transmission format is not compatible with common desktop applications.

In order to simplify the document exchange process, it is desirable that all metadata travel with the document and not be sent as a separate transaction. This was reflected in the GEDI standard. Is there a way to achieve this without creating a new file type? In fact, it is done all the time. Widely available software tools exist to package multiple files. These include archiving utilities, such as tar, and compression utilities, such as gzip. Both tar and gzip are available in open-source implementations and do not employ proprietary algorithms, which would require the payment of royalties. Utilities for expanding gzipped tar archives are freely available for common desktop platforms such as Windows, Mac OS, and Linux. Therefore, EDEN will specify that documents be exchanged as one or more binary files accompanied by a separate text file containing metadata marked up in XML. All files associated with a single document delivery transaction will be in a compressed archive format, initially tar/gzip.

DOCUMENT METADATA

Although the EDEN protocol is intended to either complement or supersede GEDI, it is anticipated that EDEN will benefit directly from the work that went into defining its predecessor. The GEDI standard defined a range of metadata in the document header. These elements, many of them optional, were grouped into five types:

- Type 1: identifying information about the Document Interchange Format itself
- Type 2: naming and time information for the Transfer Mechanism
- Type 3: other information about the particular Electronic Document Delivery Transaction
- Type 4: information specific to the document, including a brief bibliographic description

- Type 5: padding to allow for subsequent changes to the header without changing the header length (optional)

Of the five types identified above, only the last is clearly no longer required by EDEN. The GEDI Header is marked up in SGML, the precursor to XML. It is feasible to replicate the GEDI Header elements in XML should that prove to be desirable. In any case, it is expected that the elements defined in the GEDI Header will form the starting point for identifying elements to be included in EDEN metadata.

PROCESS SEQUENCING

For ease of implementation, the EDEN process governing document exchange transactions is designed to be as simple as possible. In the initial iteration of the testbed application, events will proceed according to the following sequence:

1. When a document is available to be sent, the supplier notifies the client system. The notification consists of a Uniform Resource Identifier (URI) pointing to the location of the document. The URI contains at a minimum a unique transaction ID generated by the supplier. The transaction ID will be returned to the supplier in all messages from the client system. The notification may also contain a checksum to be used by the client system to verify successful transmission of the document.
2. When the client receives a notification of document availability, it may return an optional confirmation that the notification has been received.
3. The client retrieves the document from the URI provided in step 1.
4. The client notifies the supplier that the document has been successfully retrieved. If within a set interval the supplier receives neither a confirmation of receipt of the availability notice, nor a confirmation of successful document retrieval, the supplier may send out additional notifications of availability until such time as the document has been purged from the supplier's system. If the document appears to have been corrupted in transmission, the client system may re-request the document.

Documents are purged from the supplier's system after an interval determined by the supplier based on local conditions, in particular the availability of storage space. The supplier may choose to purge a document any time after the confirmation of successful document retrieval has been sent by the client system.

Note that the above sequence does not cover document preparation, as that is expected to be specific to a given implementation. A document is available to be sent when it has been properly formatted with the required metadata and uploaded to an EDEN-compliant server. Document handling following retrieval is also expected to be implementation specific.

SECURITY

Several security considerations need to be taken into account in designing an EDEN implementation. The transmission process described in the foregoing section is insecure insofar as the document to be transmitted exists briefly on the public Web. When a document becomes available, any Web client, including a standard desktop browser, is capable of accessing it. However, this is mitigated to a degree by the fact that documents will come and go rapidly and the URIs are not published except to the client system.

Additional security may be obtained through randomizing transaction IDs. If transaction IDs were to consist of random strings run through a one-way encryption algorithm such as MD5, it would be effectively impossible for third parties to guess them. Security through obscurity is not generally thought to be the best policy but, in the case of the typical materials exchanged via DocDel, it may be good enough. If the payoff to cracking an EDEN implementation consists of access to random research papers, it is doubtful that anyone will expend much effort on it.

A much higher level of security could be obtained through the use of public key encryption. EDEN documents could be encrypted by the supplier with a public key supplied by the client. This would effectively block document access to anyone not in possession of the client's private key. Even if documents were intercepted in transmission, they could not be read. It is questionable whether this level of security is desirable, but if it proves to be necessary EDEN systems could be built to run in encrypted mode.

Security considerations also exist on the client side of the transaction. Here, the key consideration is whether the supplier is a trusted source. In the process described above, the client has no way to know in advance if the document being supplied is related to an outstanding request or not. If the supplier is not trustworthy, the download might be not a document at all. It could be spam, a virus, or a trojan horse. This is true for GEDI-based document delivery systems as well, although risk is mitigated somewhat by the hurdles of participating in existing GEDI-based document delivery networks. Proprietary software and unusual document formats might not completely prevent abuse, but they probably raise the bar high enough that spammers and crackers will continue to choose easier avenues of attack.

One way to limit abuse in an EDEN system would be to require the client to supply its own transaction ID at the time a document was requested. The client's transaction ID would be returned by the supplier along with the notification of availability. If the transaction ID was not present in the notification, the client could simply choose not to retrieve the document. This would require untrustworthy suppliers to guess the client's outstanding transaction IDs in order to complete a successful file transfer.

The problem with this approach is that the client's document requests occur outside the document transmission process as described above. Depending on how well the supplier's ILL and DocDel systems are integrated, including the

client's transaction ID in the notification of availability could require human intervention. Apart from being additional overhead, manual rekeying could introduce errors that would cause the process to occasionally fail.

A better approach would be for the client to maintain a list of trusted suppliers. Servers not in the client's supplier list would be considered untrustworthy. Documents from unlisted suppliers would either not be retrieved at all or retrieved and flagged until their status could be verified.

Finally, proper document handling by the client system can go a long way toward mitigating the dangers posed by external binaries. Documents will arrive in the form of compressed archives, posing no immediate danger to the client system. The XML metadata included with the file can be parsed without expanding the archive and matched against outstanding requests even before the file is processed. Obviously, incoming files will be stored outside the Webserver's document tree; the testbed implementation will store incoming files as blobs in a relational database, effectively neutralizing any executable code. A production system could also scan incoming files for virus signatures.

CONCLUSION

Work on the GEDI standard was partially funded by the European Commission and developed by representatives from the Online Computer Library Center (OCLC), RLG, the Ministère de l'éducation nationale, de l'enseignement supérieur (MENESR), Questel, Telis, the Universitätsbibliothek/Technische Informationsbibliothek (UB/TIB), Pica, and the British Library Document Supply Centre (BLDSC). Its testbed, EDIL, took two years to implement, at a cost of \$2.5 million. The testbed successfully demonstrated the feasibility of using GEDI for document exchange across dissimilar technical environments: over 1,000 documents were exchanged over a period of several months. Despite the successful implementation, the associated costs and the general shift in the mid-1990s toward electronic publishing discouraged further implementation of GEDI as a cross-domain EDE protocol (Braid, 1995).

In contrast, the EDEN protocol will be developed by an ad-hoc group of interested participants based, at least initially, in western Canada, with development work to be carried out by the University of Winnipeg. The first version of the EDEN testbed was expected to be operational in mid-2005, six months after the project was announced.

The difference in scale and timeline reflects the quantum leap forward taken by networking and related applications since the early 1990s. In part, developing the EDEN protocol will be easier simply because aspects of the GEDI design can be repurposed in the present context. But more importantly, the global spread of the World Wide Web provides a uniform environment that will greatly reduce the amount of work required to achieve interoperability. Finally, the ready availability of the software tools

and applications needed to build a testbed implementation means that development will largely consist of assembling preexisting components. Much of the heavy lifting has already been done.

Whether or not the EDEN protocol becomes widely adopted, the project will be considered a success if it can demonstrate that library-to-library EDE is readily achievable using common tools and technologies. Hopefully, it will help to spur the creation of a new generation of library EDE applications that will move beyond the current proprietary model to attain true interoperability.

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Consortia in Europe: Describing the Various Solutions through Four Country Examples

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ABSTRACT

This article describes and discusses consortia models in Europe. Emphasis is given to those consortia that support content provision and access to electronic information resources in society. Four country cases are introduced as examples of the heterogeneous solutions chosen by the consortia. The main results and impact of the consortia are discussed. International cooperation has played an important role in the development of consortia in Europe. Regional and global collaboration initiatives are also discussed.

INTRODUCTION

The number of library consortia existing worldwide is significant. More than 180 organizations are listed on the International Coalition of Library Consortia's Web site, and almost 40 of these are European organizations. Europe is a mix of different cultures, languages, and nationalities, with varying historical and cultural backgrounds; there are more than forty countries and around forty languages spoken in Europe. In many countries more than one language is spoken as a native language. In many parts of Europe, especially in the south and east, electronic resources in languages other than English are required. Very often, providing these alternate resources has proved difficult. The economic situation in European countries differs very much as well. In most parts of Europe, the national information technology (IT) infrastructure is of very high quality and forms the basis of the development of digital services. However, this is not yet the case in all European countries.

The models chosen for consortium cooperation in Europe range from centralized to decentralized solutions and from well-organized to poorly organized consortia; funding and staffing solutions vary as well. Giordano

(2002) has analyzed library consortium models in Europe. He has found three basic models: national centralized models, national decentralized models, and regional models. National centralized models are typical for the Nordic consortia. France is an example of a national decentralized model. In Belgium the French and Flemish speaking universities have each formed their own consortium. These might be called regional consortia. In many countries, more than one model is in use. For example, in the UK there are discipline-based, regional, and national consortia.

Today there is a strong emphasis on national and international cooperation in libraries. In Europe, cooperation within the European Union is highlighted, and there are also some signs that cooperation with Asian countries is becoming more active. The changes in the working environment of libraries most likely have increased the need for and the benefits of cooperation. In the digital environment, services can be centralized, resulting in significant savings, and the division of labor between various stakeholders can be redistributed.

FINLAND

FinELib: The National Electronic Library Program

The National Electronic Library program of Finland—FinELib—was launched by the Ministry of Education in 1997. The aim of its activities during the first years of its operation was to support higher education, research, and learning in Finland. The program was started in accordance with the government's Information Society Programme. The basic goals of FinELib were to increase the amount of electronic information available to users, to improve information retrieval from the Internet, and to develop a graphical user interface to give access to heterogeneous information resources available to users from different sources. The goals have remained the same, but the focus of the program has been enlarged. Since 2004 the emphasis has been on promoting access to information for everybody.

For the period 1997–99, operations were of a project nature (Hormia-Poutanen, 1999), but from 2000 onwards operations have become a standard part of the activities of Helsinki University Library—the national library of Finland. During the first years of operation, the principles that guide the activities were formed. These principles cover such topics as licensing policy, share of central funding, selection of resources to be licensed, development activities, and cooperation with the library network as well as with other important national and international players (Hormia-Poutanen, 2002a).

The funding model is based on centralized funding from the Ministry of Education and consortium members' own funding. In the first years of operation there was government funding for the universities only. Today,

polytechnics and public libraries also receive government funding. The level of central funding in 2005 is 4.5 million euro.

The FinELib Consortium: Crossing Organizational Boundaries

The National Electronic Library program is itself a consortium that, in 2005, consists of 108 members. All universities, polytechnics, and public libraries, as well as 36 research institutes, belong to the FinELib consortium. Libraries in Finland are accustomed to working within their own sector; funding is also allocated to each sector separately. FinELib is one of the first programs in which different types of organizations work hand-in-hand to obtain synergy from cross-sectoral cooperation. Due to large, shared national projects, such as the implementation of the national portal, the Ministry of Education has also seen the need to coordinate activities across the library sectors.

The main principles guiding the management of the consortium have been defined in the Memorandum of Understanding (MOU, 2004), which has been updated recently and covers the period 2004–2006. FinELib has a service agreement that covers two main services: the licensing of e-resources and the maintenance of the national portal. In these service agreements, the responsibilities of the National Library and the customer have been defined.

The program is managed through three working groups. The high-level steering group is responsible for policy making, strategic planning, drawing up the annual Plan of Action, and evaluating the results. The group consists of top-level management from the universities, polytechnics, research institutes and their libraries, the public libraries, the Ministry of Education, and the end-users. The consortium group is responsible for more practical issues and consists of library directors from the four library sectors. The expertise of the various fields of science, as well as technology issues and the interests of end-users, are represented in the expert groups. Their main task is to submit proposals for resources to be licensed in the future and to develop National Electronic Library Interface (Nelli) portal services at the organization level. Although the final decisions have to be made by the National Library, this three-tier organization guarantees that all consortium members can make their voices heard and influence decisions.

National Electronic Library Program: An Active Player in the Development of the Information Society

In 2005 FinELib is a well-known and highly valued national program. Funding is directed toward the acquisition of high-quality electronic resources as well as the development of the national portal. The funding also includes additional costs, such as staff and staff development. The estimated total cost in 2005 is over 12 million euro, consisting of central funding and the organizations' own funding.

From the libraries' point of view, FinELib is regarded as a service center for libraries. A good deal of effort goes into developing the working methods within the service center to meet the needs of the libraries. Emphasis is also given to expanding the expertise of the staff. In 2005 the staff consists of twelve members, half of whom work on licensing issues and half on implementation and development of the national portal.

In 2005 FinELib signed license agreements covering 19,500 e-journals; 230 databases; and 25,000 e-books, dictionaries, handbooks, and even software (see Table 1). The acquisitions that are made through FinELib cover 84 percent of the acquisitions of electronic resources at Finnish universities. Thus, FinELib has a key role in providing electronic materials for the user population of universities. According to user surveys and usage information, the selection of resources meets the needs of the users well (Hormia-Poutanen, 2002b). Over the years FinELib has been operating, there has been a growing trend in usage.

The National Electronic Library Interface, Nelli, was launched for universities early in 2005. The implementation process was also started at public libraries and polytechnics. The portal will become a national service for end-users. The National Library will provide centralized services for the participating libraries, which will save a good deal of work. The portal will then be tailored at the organization level to meet the needs of local users. Individual users can tailor the portal to meet their needs as well.

Thus far, the most significant result of the FinELib program is the increase and improvement of high-quality content services on the Internet. The electronic material available to researchers, teachers, and students is considerably more extensive than ever before, and it can be accessed nationwide (Hormia-Poutanen, 2004).

Cooperation across organizational boundaries can also be considered as a very important result of the program (Hormia-Poutanen, 2002c). There is a strong emphasis on horizontal cooperation in the public sector in Finland today. Examples of this are the government policy programs, which encourage the ministries to cooperate to solve questions defined in the government platform. The impact of Nelli will be assessed later, when the service is in full production.

GREECE: HEAL-LINK

HEAL-Link (Hellenic Academic Libraries Link) started as one of the four action lines of a project funded by the Greek Ministry of Education under the umbrella of European Union Structural Funding. The project aimed at developing cooperation involving all the academic libraries in Greece. The action line that brought HEAL-Link into being was a mandate for cooperation to face the problem of the ever-shrinking journal collections in Greek academic libraries (Kohl & Dervou, 1999).

Table 1. Key Figures for FinELib in 2005

Indicator	Key Figures
Total cost	12 million euro
Funding	Central funding (4.5 million euro) Organizations' own funding
Consortium	108 members, including universities, polytechnics, public libraries, and research libraries
Governance	Memorandum of Understanding Service agreements (portal, licensing)
Licenses	19,500 e-journals, 230 databases, 25,000 e-books
Usage	3.7 million article downloads

HEAL-Link started operating in 1998 by signing its first agreement with Elsevier for access to the electronic journals in ScienceDirect. More agreements were signed during 1999 (for example, with Elsevier, Kluwer, Academic Press, MCB, and Springer), thus giving its members access to 3,500 full-text journals. OhioLINK has been the model for developing HEAL-Link (Xenidou-Dervou, 2001). Swets has been assisting HEAL-Link in negotiations and financial administration since the very beginning.

During its first three years of operation, HEAL-Link members were obliged to keep their print subscriptions to the above-mentioned publishers, while the project shouldered the extra costs relating to license agreements. In 1998 six of the thirty-four academic institutions had more than 80 percent of the total print subscriptions and carried the corresponding cost. By 2001 all of them were in debt and could no longer keep up the print subscriptions they were obliged to retain according to the license agreements. Following a proposal by the steering committee of HEAL-Link, the Council of Rectors of the Greek Universities decided that the consortium should move over to e-only agreements with mandatory cancellation of print subscriptions for the corresponding e-journals. One printed archive copy was to be deposited at the National Documentation Center. The cost was to be distributed among the institutions in accordance with the financial support each of them was receiving from the state. The Council of Rectors suggested that the financial contribution from each university budget be sliced off the top by the ministry and given to the coordinating organization to cover the cost of the license agreements. The ministry decided not to cut the budgets of the academic institutions any further but to shoulder the cost of all the HEAL-Link agreements with extra funding over the next three-year period (2003–2005). Starting in 2003 HEAL-Link had agreements with twelve publishers, thus giving its members access to 7,500 full-text, peer-reviewed journals (Xenidou-Dervou, 2003). In November 2004 the ministry promised to continue the central funding for the next five years, until 2009.

HEAL-Link has no legal structure. All the institutions have signed a memorandum of understanding with the coordinating institution. It is governed by a governing body of thirty-four members, one from each academic institution. The chairman of the governing body has the authority to sign the license agreements. A five-member steering committee appointed by the governing body is responsible for the negotiations and the running of the consortium. There are two full-time employees (one system administrator and one librarian) who keep the consortium portal up-to-date and offer a help desk to the members. These two employees are paid by the project, which will run until 2006.

In addition to licensing, HEAL-Link has also been active in developing a portal to provide access to e-journals (Xenidou-Dervou et al., 2002). The portal has been running since 1999. Users can also retrieve information on copyright issues in Greece using Zephyr, a Z39.5 interface that has been developed by the University of Crete, and simultaneously search the Online Public Access Catalogues (OPACs) of all Greek academic institutions, including the HEAL-Link portal. In 2005 HEAL-Link plans to start using a commercial federated search and open URL software application.

In 2005 HEAL-Link has sixty members (see Table 2). Members of HEAL-Link include all the Greek academic institutions funded by the Ministry of Education, plus a large number of research institutes of the General Secretariat for Research and Development, which operates under the Greek Ministry for Development. By constitution, all higher education institutions in Greece are public bodies.

The basic aim of HEAL-Link is to provide the entire academic and research community in Greece with access to full-text e-journals. This means that all the members have equal access to the full-text content. In addition to the main task, HEAL-Link also negotiates license agreements for groups of members interested in specific databases.

The acceptance and use of HEAL-Link e-journals has exceeded all expectations. Even without any publicity, there was hardly any resistance to switching to electronic resources only, and the usage statistics from the publishers demonstrate the high usage, which is continuously growing. The reason is that Greek universities moved from collections of 500 to 1,000 journals each on average to a collection of almost 9,000 peer-reviewed journals (including the open-access journals that have been added to the collection).

RUSSIA

NEICON: Nationwide Consortium Supporting Access to Electronic Information

NEICON (the National Electronic Information Consortium) includes 181 organizations in 2005. Among these are classical and specialized universities, public libraries, academic institutes, and other noncommercial organizations. The primary goal of the NEICON consortium is to provide

Table 2. Key Figures for HEAL-Link in 2005

Indicator	Key Figures
Members	Sixty academic and research institutions
Governance	Memorandum of Understanding
Funding	Central funding by the Ministry of Education
Services	Licensing Portal development and management
Licenses	9,000 e-journals
Archiving	In addition to archival rights, one print copy is deposited at the National Documentation Centre

Russian organizations with access to scientific information resources via the Internet (see Table 3).

The consortium's funding is based on multichannel financing consisting of fees from libraries, funds from the Ministry of Culture, and grants from various organizations, the most important being the Open Society Institute (OSI) and the Ford Foundation. All funds are transferred via the consortium's accounts and are controlled by the consortium. Most of the money is spent on subscriptions. Subscription costs are covered partly by third-party funds and partly by membership fees. The subsidy share varies from one resource to another and may also depend on the organization itself. For instance, the funds of the Ministry of Culture may only be allocated to the public libraries, which come under the control of the ministry. Administrative expenses (wages, business trips, seminars, telecommunications) are covered with funds from various sources. Initially, when the consortium was being created, equipment and staff wages for the first year were covered with an OSI grant; today administrative expenses are covered by funds from the Ministry of Culture and membership fees.

The NEICON consortium is a legal entity that was registered according to the law of the Russian Federation in November 2002. NEICON is a noncommercial partnership established by five institutions: the Russian State Library, the Russian National Library, the Library of Foreign Litera-

Table 3. Key Figures for NEICON in 2005

Indicator	Key Figures
Total Cost	Approximately 1 million euro
Funding	Central funding, grants, membership fee
Consortium	181 members 104 universities, 34 academic institutions, 37 public libraries, 6 other insitutions
Governance	Coordination council Frame agreement
Services	Licensing, training
Licenses	About 10,000 e-journals
Usage	About 1 million documents downloaded in 2005

ture, the Pushkin Library (a noncommercial foundation), and the Science Information Support Foundation. All consortium members have signed a framework partnership agreement. Each subscription is based on an additional agreement specifying the costs and methods of payment. The consortium is directed by a coordination council, which makes corrections to and approves the strategic plan for the current year. The council has developed a network of experts who promote the use of the resources at their parent organizations.

One of the core aims of NEICON is to promote the use of electronic resources in its member organizations. The Russian end-users are not yet accustomed to using electronic resources and are somewhat reluctant to do so. They also lack the necessary skills.

NEICON Services and Results

The main service the consortium offers its member organizations is negotiation licenses with good pricing and legal conditions. In some cases, license agreements have been reached totally free of charge. Since the majority of the providers are foreign, the consortium helps to solve legal problems concerning the adaptation of the licenses to Russian law. Advice is also given on solving problems associated with economic issues—for example, currency-related questions and methods of making international payments abroad.

In addition to licensing, training on consortium activities, licensing, resources, etc. is organized for the consortium members. Since the Russian Federation is a large country, NEICON usually organizes training sessions in the regions to reduce transportation costs. Such regional training sessions are usually organized at universities or central libraries, and all interested organizations in the region are invited. NEICON collects and analyzes usage statistics to evaluate use. Statistics are also collected about trial access to track potential users. End-user surveys are also run by the consortium.

The main results of NEICON include a significant increase in the electronic resources available to Russian organizations and a steady growth of the number of users. At the beginning of 2002 Russian participants in the eIFL Direct project had only a few EBSCO Publishing databases, which included about 3,000 journals. In 2004 license agreements were signed with several leading providers: EBSCO Publishing, Cambridge University Press, Oxford University Press, LexisNexis, CAB International, ProQuest, World Bank, Elsevier B.V., and several Russian languages resource providers. The total number of journals available through NEICON contracts is about 10,000 e-journals. The number of organizations subscribing to EBSCO databases in 2002 was 65, but NEICON now has 181 official members.

Providing access to the electronic resources is, however, only the first part of the goal of the project. The main goal for the next few years is to provide the members of the consortium with information services on

existing resources; namely, to create a suitable approach to analyzing the completeness of the information support in each organization and the databases used and to create a single point of access. NEICON has high hopes for the Open Access Initiative, which is also expected to develop in Russia. Another priority is to help create and develop scientific resources in the Russian language, which are very scarce at the moment.

The NEICON consortium is a unique organization in Russia. NEICON is contributing a great deal to the development of the information society and promoting information equality in society, something that has been somewhat problematic over the last few decades. The Ministry of Culture has been supporting NEICON for the last three years, and support from other government bodies is expected.

THE UNITED KINGDOM

UK Library Consortia: Regional, Discipline-Based, and National Consortia

The UK has a variety of different types of library consortia ranging from regional consortia, to specialist discipline-based consortia, to national consortia that focus on electronic library resources. They are constituted and managed in a variety of ways. Some are traditional consortia consisting of a defined group of libraries working together to enhance services for users through, for example, procurement of library resources, staff training and development, and reciprocal access agreements. Ball defines these consortia as “an association of independent organisations that act in concert to procure for themselves goods and/or services specific to libraries” (Ball & Pye, 2000, p. 25). Other consortia—in particular the national consortia—are what might be termed “loose” consortia that negotiate with suppliers on a national basis; libraries opt-in to selected deals for the resources they require.

Typical of a traditional regional consortium is the North West Academic Libraries (NoWAL), a consortium of all the UK University and College of Higher Education libraries in Cheshire, Cumbria, Greater Manchester, Lancashire, and Merseyside in the northwest of England. In addition to consortia purchasing of printed journals and books, NoWAL has also moved into the area of electronic resource purchasing, including a recent agreement with NetLibrary for electronic books. In addition, the consortium offers collaborative staff training and development, promotes interaction with providers of information and communications technology (ICT) services for higher education in the northwest, and promotes cross-domain and cross-sectoral collaboration with organizations such as public libraries, museums and galleries, and the National Health Service (NHS). Research undertaken by Ball (Ball & Pye, 2000) indicates that expenditure by the eight higher education library consortia that geographically cover the whole of the UK amounts to over £85 million, or 125 million euro.

Discipline-based consortia are also successful in the UK. An example of such a consortium is the Consortium of Health Independent Libraries in London (CHILL). CHILL currently has thirty-five members, representing over one million users, including major libraries such as that of the British Medical Association, public information organizations such as the Family Planning Institute, research institutes such as Cancer Research UK, and major health organizations such as the Public Health Laboratory Service. Whilst operating mainly as a purchasing consortium (it has negotiated contracts for 8,500 printed journals for its members), it has also initiated other resource-sharing projects and provides a common voice to represent the interests of its members in national information or health initiatives.

A rather different type of consortium, whose primary focus is not purchasing, is the Consortium of Research Libraries (CURL). CURL's stated mission is to "increase the ability of research libraries to share resources for the benefit of the local, national and international research community" (CURL, 2005). To further that mission, the consortium works on collaborative research, advocacy, and the forming of strategic alliances to benefit research support. CURL's membership comprises the major research libraries in the UK, including the British Library, Oxford and Cambridge University libraries, the National Libraries of Scotland and Wales, the library of Trinity College Dublin, and twenty-two other university and specialist research libraries—a total of twenty-eight members in all. An important research tool supported by CURL, and funded by the Joint Information Systems Committee (JISC), is the union catalog COPAC (copac.ac.uk), which gives free access to the merged online catalog of all its members and contains some 30 million records.

CURL is currently engaged in a number of significant research projects that benefit both the libraries and users of CURL institutions as well as the wider community. Ongoing projects include the Archives Hub, which provides a single point of access to the descriptions of archive collections held in universities and colleges in the UK; Britain in Print, which provides electronic access to significant collections of pre-1700 British books for the benefit of the general public; SHERPA (Securing a Hybrid Environment for Research Preservation and Access), which focuses on institutional e-print repositories; and, most recently, ETHOS (Electronic Theses Online Service), which aims to provide electronic access to all UK university research theses.

In addition to regional and specialist consortia, the UK also has other organizations that act as consortia (particularly in relation to purchasing) at the national level. The first is Eduserv Chest, a not-for-profit organization that acts as a "buying club," negotiating for commercially available e-resources for the UK education and research communities as well as institutions outside the UK in various Scandinavian countries and the Republic of Ireland. It has one simple objective: to negotiate for and manage

e-resources requested by the community. It is “driven only by demand and the need to provide better value for money than can be obtained elsewhere” (Eduserv Chest, 2004). Demand is assessed in conjunction with the JISC User Group—comprising subject librarians from around the UK—and a product “wish list” is compiled and evaluated.

Eduserv Chest developed from an organization called CHEST (Combined Higher Education Software Team), which, as its name suggests, was originally focused on national negotiations for computer software licenses. During the 1990s it added bibliographic databases to its portfolio by negotiating a national license for the Institute for Scientific Information (ISI) Citation Indexes. The UK service was hosted by Bath University at the Bath Information Data Service (BIDS). A large number of UK academic libraries opted to license the ISI Citation Indexes through CHEST, and successful negotiation for other databases followed. Currently, CHEST offers a wide range of commercially available e-resources including abstract databases, full-text e-journals and e-books, and courseware. Agreements are usually for three or five years, almost all being site licenses, which means that all students and staff within an organization may use the licensed resource either on or off campus. Payment is by a single, fixed annual fee to Eduserv Chest.

Probably the key organization in consortia purchasing in the UK is the Joint Information Systems Committee (JISC), which is funded by the UK Further and Higher Education Funding Councils. JISC has a wider remit than just libraries and e-resources as it is also responsible for the UK higher and further education computer network JANET (the Joint Academic Network) as well as the development of the technological infrastructure to support learning, teaching, and research. However, it is the JISC collections strategy and the activities of the JISC Collections Team that will be examined in this article.

The Role of the JISC in Supporting Education and Research through Consortia Licensing

The draft JISC Collections Strategy of 2004–2006 states that the Collections Team mission is “To negotiate for, and, where appropriate, to licence, quality assured electronic materials that will provide the JISC community with a range of resources to support education and research” (JISC, 2004). While negotiations for content are conducted at a national level (sometimes using the services of an external Negotiating Agent), it must be stressed that JISC is a loose consortium. Once terms have been negotiated with a publisher, any higher education institution may accept them. Participation in any particular deal is voluntary, not compulsory. Such a system is perhaps not ideal. As pointed out by Friend when discussing the National Electronic Site Licensing Initiative (NESLI): “we cannot bargain as effectively as we could if we knew that we could offer the publisher a definite number of

subscriptions. The situation is not ideal, but it is one we have to live with given our political environment" (Friend, 2002, p. 21). Nevertheless, many libraries and colleges do opt-in to national JISC deals and good terms have been negotiated.

The JISC budget for Content and Services is just over £10 million (14.68 million euro). However, this is not all for licensing content but includes the financing of content-related services such as the JISC data centers, which host JISC-licensed content and services such as ATHENS (a service used to authenticate and authorize users for access to online services).

Six format-based Working Groups support the Collections Team in acquiring online resources, and members of the groups are drawn from the educational community. Formats covered are journals, e-books, images, moving pictures and sound, geo-spatial data, and learning materials.

Examples of the wide range of resources available for libraries to subscribe to or license within the JISC portfolio include the following:

- Licensing of over 9,000 scholarly journals through NESLI2 negotiation with 10 major e-journal publishers
- Acquisition, in perpetuity, of more than 125,000 e-book titles published between 1473 and 1700 in the Early English Books Online (EEBO) collection
- Partnership with the Universities of Michigan and Oxford in the EEBO Text Creation Partnership to create fully searchable text files
- Licensing of Ordnance Survey map data, which is then made available through the Digimap service
- Licensing of the Managing Agent and Advisory Service (MAAS) Media Online collection of hundreds of films and videos, copyright cleared and digitized by JISC
- Building an e-reference e-book portfolio comprising Britannica Online, xreferplus, and Oxford Reference Online

A range of economic models is utilized by the JISC to make e-resources as widely available and accessible as possible to the education community. The models used depend upon the type of resources in question. "Heritage collections" include digitized images of rare and/or inaccessible materials such as journal back files and older books. The static nature and high value of these scholarly collections allows the JISC to provide access and financial benefit through perpetual licenses at a national level. Education institutions are not required to pay a subscription fee for the content but may be required to pay a modest access fee.

"Mature resources" are those that are well established within the community. In such cases, negotiations on price and license terms are undertaken at the national level but, once an institution has opted-in to the deal, the license agreement is between the publisher and the subscribing

institution. It should be noted that JISC negotiations require that a Model Licence is signed by the publisher. The original license conditions were drawn up in extensive consultations between the JISC, the Publishers Association, and the Association for Learned and Professional Society Publishers (ALPSP).

"Specialist resources" are those that provide high value to those undertaking research, teaching, or studying in a particular niche discipline. Careful consultation with the JISC community ensures that subscription take-up is predicted accurately. This means that the JISC can negotiate good terms, and, in some cases, the JISC will subsidize such deals.

Finally, in line with its overall mission, the JISC is keen to promote innovative resources. These may originate from the commercial sector or from the JISC community, and the JISC National Data Centres often play a key role in developing exemplar services. In such cases, JISC provides a planned subsidy that may well decline as products move through their life cycle.

COOPERATION IN CONSORTIUM LICENSING

Cooperation is the basis of library activities. Libraries cooperate within their parent organization, between libraries, and also with various stakeholders. Cooperation has also played a key role in promoting consortium licensing and in developing expertise at libraries. In Europe the International Coalition of Library Consortia (ICOLC), the European ICOLC, and Electronic Information for Libraries (eIFL) have had very important roles in promoting cooperation between libraries and in promoting consortium development and licensing. Cooperation among these three players has become more active over the last few years.

The first licensing principles in Europe and in the United States were developed in collaboration. In Europe a group of German and Dutch libraries created the *Ligue des Bibliothèques Européennes de Recherche* (LIBER) principles, which have had a very important impact on licensing in Europe. For example, in Finland the Council of University Rectors has recommended that the LIBER principles should be followed when licensing electronic content for Finnish institutions. ICOLC principles have been created in collaboration with North American libraries. The latest update was carried out as a North American–European collaboration, indicating that our aims are the same in different parts of the world. International licensing principles have made the aims of libraries known to publishers and have helped consortia worldwide to reach their goals in negotiations.

ICOLC meetings in North America and Europe, eIFL meetings, and the ICOLC and eIFL mailing lists have made it possible for consortia to share experiences and learn from each other. Altogether, it is very important that consortia have forums in which to meet and discuss consortium issues. In addition to international cooperation, regional cooperation has been important, especially in northern and southern Europe. eIFL has played

a crucial role in supporting the Eastern European countries in knowledge sharing, promoting Open Access, and developing consortia activities, as well as in licensing.

Nordic Cooperation

Nordic research libraries have a long tradition of networking and sharing resources. The Nordic Council for Scientific Information, NORDINFO, was for many years an initiator and a source of funding for initiatives to promote such cooperation. Cooperation and networking within the field of consortium licensing can be seen as a natural extension of this Nordic tradition.

The task of licensing on behalf of academic libraries was taken on in the mid- to late 1990s by organizations with experience in library cooperation within their own countries—in Denmark by the Danish National Library Authority, in Finland by the National Library, in Norway by the Norwegian Archive, Museum and Library Authority, in Iceland by the National Library, and in Sweden by the Royal Library.

The Nordic national consortia—DEF (Denmark), FinELib (Finland), ABM-utvikling (Norway), and BIBSAM (Sweden)—have a lot in common, but each of them still has its own characteristics. National licensing in Iceland has developed somewhat differently from the other Nordic countries and will not be examined further here.

The Nordic licensing offices are formally integrated into large, stable government organizations. Usually, one licence is signed on behalf of all the participating members and one invoice is issued. The membership of each consortium is usually large and well defined. These characteristics contribute to making Nordic consortia attractive as negotiating partners for publishers. Overlapping membership between consortia can be a challenge in other countries. This is practically nonexistent in the Nordic countries.

Since the time of establishing national licensing offices, the staff at DEF, FinELib, ABM-utvikling, and BIBSAM have been engaged in an informal network. The group now meets regularly and communicates via an internal e-mail listserv. Estonian librarians have also participated in the meetings, especially when they have taken place in Finland. The objectives of the network have changed over the years. Early on, license negotiations and library consortium management were brand new tasks for the staff involved. The Nordic network provided a welcome opportunity for organizations to discuss and exchange experiences with peers who found themselves in similar situations, faced with similar challenges.

The transition from paper-based to digital journal collections has progressed rapidly in the Nordic countries, supported by well-developed technical infrastructure. The increasing costs of scientific journals has motivated libraries to cancel print subscriptions to journals that are also available online, but only if archival access is granted through the license. E-only licenses, with no discount for print subscriptions, are preferred by both

FinELib and BIBSAM. This has allowed Finland and Sweden to explore alternative models for cost division within their consortia (Stange et al., 2003). In Norway the transition toward e-only has been slowed down by unfavorable Value Added Tax (VAT) regulations. DEF members prefer to have the option to purchase print subscriptions at discount rates. These differences can complicate the picture in multiconsortia negotiations with journal publishers.

Some of the concrete results of collaboration include joint Nordic licenses and work-around cost division models. In 2002 Nordic licenses were signed with the American Chemical Society (ACS) for access to ACS Web Editions and ACS Journal Archives and with the Nature Publishing Group for access to Nature Journals. For legal as well as practical reasons, each consortium signed separate licenses. The Nordic licenses had almost identical content apart from membership and contact information. The same concept has subsequently been tried with a few other publishers without Nordic agreements being reached. In some cases, two of the Nordic consortia signed a licence, while others declined.

South European Libraries Link (SELL)

Consortium collaboration in southern Europe started in 2001. SELL consists of Greece, Italy, Portugal, Spain (Catalonia), and Turkey. A statement by the Catalanian consortium in Spain on the ICOLC mailing list in 2000 provided the impulse to start collaboration between these countries. The statement made it clear that the southern European countries face the same kind of problems. SELL organizes annual meetings in the participating countries. The cooperation of the consortia in the Nordic countries has been the role model for SELL.

NEICON

Cooperation is the basis of the activity of NEICON in Russia. As the consortium operates in a large territory, libraries are grouped in certain regions to serve as mini-consortia within NEICON. The NEICON consortium is a member of eIFL and ICOLC. eIFL has been the main initiator of the creation of the consortium in Russia, and knowledge and experience has been gained through eIFL. Currently (in 2005), eIFL is the primary foreign partner of NEICON and is helping to promote the project.

Experiences of Regional Cooperation

The experiences of collaboration in the three cases described above are positive overall. Within the Nordic consortia, sharing knowledge on consortium issues, licensing, and negotiating has expanded the expertise of the staff involved. For example, benchmarking of prices, processes, and tools used in the licensing process has been invaluable. The exercise the Nordic group has developed around cost-division models is an example of a practical problem that has been solved through cooperation.

For the publishers, negotiations with the group of Nordic consortia representatives has offered an opportunity to efficiently reach a large market through one or more well-defined points of contact. As similar terms are wanted in the Nordic licenses, the process of reaching agreement on specific terms could be made more efficient. One objective has been to convert these efficiency measures into better discounts for the consortia and thereby offer a deal that would attract many participants. Another objective of the group negotiations was to provide the publishers with information about the characteristics of the Nordic consortia. Through better mutual understanding of local, national, and Nordic issues, licenses could be tailored to the group's special requirements. It is difficult to judge how well these objectives were met, as there is hardly one single consortium deal that can serve as a relevant point of reference. However, one specific outcome was the message that the Nordic consortia preferred e-only agreements for e-journals, that archival access was important as part of the provisions in such licenses, and that these two issues could be efficiently communicated through approaching the publishers as a group. Lessons learned also include a better understanding of the complexity of consortium negotiations.

In southern Europe the development of regional ties has helped to address common problems and overcome isolation. The southern consortia support each other by building up mutual strengths. eIFL has played an important role in promoting consortia development and licensing in Eastern Europe.

eIFL: GLOBAL COOPERATION

eIFL was established in October 1999 as an initiative of the Open Society Institute (OSI). OSI is a private grant-awarding foundation that is part of the Soros Foundation Network. In 2002 eIFL became an independent foundation. The goals of eIFL are to build sustainable national consortia within the participating countries; be the premier multicountry negotiator to secure affordable access to commercial electronic information services; advocate the development of locally produced digital resources; promote the resources of open-access content providers; leverage multinational expertise and resources to expand the availability of and access to commercially produced and open access information; keep members at the cutting edge of relevant information and technology services; and develop model partnerships with global funding agencies, foundations, consortial groups, and content providers.

Today, eIFL is a major international umbrella organization; its network encompasses nearly 4,000 libraries across European, African, and Asian countries. New members from the Middle East joining eIFL this year will increase the number of participating countries to 50 (see Table 4).

Central and Eastern Europe as well as the former Soviet Union have been at the core of eIFL activities from the very beginning, building upon the work of the Open Society Institute in those countries as

Table 4. Key Figures for eIFL in 2005

Indicator	Key Figures
Members	50 countries 4,000 libraries
Services	Licensing Provision of model licenses Consortium and capacity building Guidelines Knowledge sharing Open Access program Intellectual property and related issues program Advocacy

far as library development and modernization issues are concerned. In Europe the current members are Albania, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Estonia, Kosovo, Latvia, Lithuania, FYROM (former Yugoslavian Republic of Macedonia), Moldova, Poland, Russia, Serbia and Montenegro, Slovakia, Slovenia, and Ukraine. These countries have sophisticated education systems, thus representing an emerging market for international providers of scholarly information. Unaffordable subscription costs alongside relatively little awareness of the electronic alternative to print subscriptions posed a barrier to access to international academic journals and databases. When eIFL started working in 1999, this lack of access to electronic resources determined that the key priority should be to guarantee sustainable access to Internet-based digital material through multicountry negotiations with providers, resulting in highly discounted subscription rates that are affordable for the participating countries. In addition, eIFL has developed a model contract and model licenses to be used in connection with the deals reached by eIFL with individual publishers.

Estonia, Lithuania, Latvia, and Poland played an inspiring role for the rest of the countries, considering that they already had some experience in setting up consortia for union catalogs and library automation systems. Those library consortia that already existed saw their networks and roles strengthened. Some of the countries listed above have a consortium registered as a legal body, and in a number of countries, due to local legal restrictions, consortia are bound by a memorandum of understanding (MOU) and are not legally registered. Funding for subscriptions also varies; some of the libraries receive central funding, while in other cases libraries contribute to the cost according to cost-sharing formulas worked out internally.

Because eIFL operates on a global scale, special attention had to be paid to communication. Information technology is widely used in information sharing amongst eIFL consortia; this includes listservs, discussion groups, and the eIFL Web site, but getting to know each other and exchanging views face-to-face at national and regional workshops and the annual general assembly remains equally important.

eIFL's efforts have yielded fruitful results for creating sound library consortia, empowering them with effective bargaining powers vis-à-vis the providers and keeping participating countries updated with cutting-edge trends and the latest news on information and technology services. Furthermore, important achievements have been reached on capacity building and information- and knowledge-sharing activities. All in all, eIFL has managed to achieve these results through its close relationship and sound knowledge of the situation in the participating countries, by enjoying active participation in national consortia, and by gaining a good reputation for being an effective negotiator and a reliable partner. As it has progressed, eIFL has encountered many challenges when carrying out its activities given the various infrastructures, wide geography involved, and different political situations, as well as the varying degrees of public access to information, the availability of funding, and the lack of skills when working in the electronic environment. However, these shortcomings have been decisively counterbalanced with the enthusiasm and commitment of library professionals in the participating countries.

While eIFL is continuing its core activities—namely, the negotiation of licenses for electronic resources, training programs on electronic resources and consortium management, and the geographical expansion to new developing countries—in 2005 it has added new services to its agenda such as the promotion of Open Access, pilot projects in institutional repositories, and capacity building and expertise in intellectual property issues, thus representing the interests of the participating countries in key international policy forums. Last but not least, eIFL is also looking into technology solutions that will help maintain affordable management of electronic information resources such as portals and open source software for libraries.

CONCLUSIONS

In the four country cases described above, the activities of the national consortia in developing content provision through licensing are supported by the relevant governments. The funding structures as a whole, however, are different in each country. In Greece, in addition to government funding, European Union funding has also been important. In Russia, funding consists of government and Open Society Institute funding and membership fees. When comparing the expenditure of consortium activities in the examples, a clear difference based on various factors can be seen. In the UK the expenditure of eight higher education library consortia is around 125 million euro; in Finland the total cost of the national consortia is over 10 million euro and in Russia about 1 million euro. The policy of allocating government funding to licensing has had very high impact, especially on research and education. In most European countries, however, licensing is not supported centrally. It is more common that support is given to digitizing cultural heritage. Actually, both action lines are needed to meet the needs of different user groups.

In Greece, Russia, and the UK the funding allocated to consortium activities is temporary; in Finland the government funding is permanent and it covers some of the licensing costs, all national portal costs, and all staffing costs. Under the umbrella of the eIFL, member countries cover the costs of licenses themselves. In Greece funding will be allocated for resources until 2009 and staffing is based on project funding.

On the basis of experiences in Finland, it is obvious that permanent funding has been crucial in developing the program and in gaining significant results in a short timeframe. Permanent funding has also raised the status of the activities in the country. Having permanent staff has been a prerequisite for innovative development of services and processes. The lack of permanent staff can be a major obstacle when developing content provision and all the related services in society. Volunteer work can result in good results in the short term, but it is very difficult to offer permanent services based on that kind of solution.

In all the examples, electronic journals are the core resources to be licensed, but other information resources are also acquired. In the UK a wide variety of resources are licensed, ranging from journals, e-books, images, moving pictures and sound, and geospatial data to learning materials. The scope of licensing is far wider than in the other country examples described. JISC also emphasizes the promotion of innovative resources. This is something other consortia could consider adding to their agendas.

Often licensing is not the only service the consortia are providing. Many consortia develop methods of easy access to information. HEAL-Link in Greece has developed a homemade portal solution and is planning to change the system to a commercial one in order to be able to use Open URL linking, for example. NEICON in Russia is planning to develop one entry point to access the licensed content. Experiences of the national portal and Open URL solution in Finland are so far limited, because only half the universities are in production. Expectations are very high, however, and experiences so far are very promising.

The authors of the country cases were asked to list major challenges for the future. The need to implement new business models and develop cost effectiveness, evaluation of usage and user behavior, as well as organizing archival rights access were mentioned among the top priorities. There is an urgent need to develop business models that allow consortia to manage license costs. In Greece the libraries were forced to move to e-only in order to manage the costs of licenses. In the longer run this is not enough. There have to be mechanisms to manage the costs of e-only licenses as well. The current trend where price increases are higher than the inflation rate is not sustainable. There is also new digital content coming onto the market. The consortia need the flexibility to purchase new types of content in addition to current collections. It will be very interesting to see what the impact of Open Access publishing will be on the commercial publishing market. The

work eIFL is doing in the promotion of Open Access is considerable. Other initiatives such as Scholarly Publishing and Academic Resources Coalition (SPARC) and national initiatives are also important.

The financiers of the licenses are interested in the cost effectiveness of the licensing as well as in licensing indicators. Neither of these issues is a simple one. How much do we save with consortium licenses compared with printed acquisitions? How can we estimate the value of increased access? How much money and time do e-only solutions save at libraries? How can we estimate the cost effectiveness of quality, for example, the quality of contracts? How much time does a researcher save due to easy access to vast amounts of high-quality resources? When the consortia have the answers to these questions it may be easier to persuade the financiers to support licensing more generously.

Greece, Finland, and Sweden have more or less moved over to e-only journal collections. Archival rights issues are crucial when such a policy has been chosen. In Greece, in addition to the legal archival rights, one print copy of all the journals licensed is deposited in the National Documentation Centre. Sweden and Finland have chosen to have archival access to electronic content. How archival access will be organized in reality remains to be seen. For libraries the most practical solution would be to gain archival access from publishers' servers. Some consortia, for example OhioLINK, have chosen to mount the content on their own servers. In these cases archival access is not a major problem.

Evaluation of use and user satisfaction is one of the challenges many consortia are currently facing. When consortia have to cut collections, they need to have the tools to do it properly. Usage information is one tool, user satisfaction information another. Both quantitative and qualitative information should be used when analyzing the collection and its usefulness to users. Evaluation of use and user satisfaction also helps to show the impact of content provision on society.

Cooperation has supported libraries in Europe in developing their consortia as well as their licensing activities. OhioLINK has been a model for consortia activities in Greece, and Nordic cooperation a model for the South European Libraries Link. All European consortia have gained from the activities of ICOLC, and eIFL has been building bridges between library consortia all over the world.

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Hazel Woodward has been University Librarian and Director of the University Press at Cranfield University for over five years. Prior to that she was at Loughborough University as Head of Electronic Information Services. Hazel's research interests include electronic publishing and scholarly communication (the subject of her Ph.D. thesis), and she has published many papers in the professional literature on digital library issues. She is very active professionally, being currently the Chair of the JISC E-Books Working Group and a member of the JISC Journal Working Group (which oversees NESLi2), as well as contributing to various SCONUL, UKSG, and ICOLC committees.

APPENDIX

Web site addresses for consortia discussed in this article.

BIBSAM: <http://www.kb.se/bibsam/>

CHILL: www.chill-london.org.uk

CURL: www.curl.ac.uk

Eduserv Chest: www.eduserv.org.uk

eIFL: <http://www.eifl.net>

FinELib: <http://www.lib.helsinki.fi/finelib/>

HEAL-link: http://www.lis.upatras.gr/LIS/HEAL-L_EN.shtml.

ICOLC members: <http://www.library.yale.edu/consortia/icolcmembers.html>

ICOLC principles: <http://www.library.yale.edu/consortia/2004currentpractices.htm>

JISC: <http://www.jisc.ac.uk/>

LIBER-principles: <http://www.kb.dk/liber/>

NEICON: <http://www.neicon.ru/>

NoWAL: www.nowal.ac.uk

SELL (South European Libraries Link): <http://www.heal-link.gr/SELL>

Interconnected and Innovative Libraries: Factors Tying Libraries More Closely Together

PETER WEBSTER

ABSTRACT

This article considers the many developments in technology and practice that are making libraries more connected and interdependent. It looks at new integrated online services and reviews the increasing importance of both formal and informal standards. Global centralized Web services are discussed. The relationships between information industry companies and libraries are considered. Virtual reference services and far-reaching digitization projects are explored. The article concludes that close cooperation is allowing libraries to take their services to new levels and is key to the continued innovation of those services.

INTRODUCTION

Library consortia, organized at the local, state, national, and international levels, are what we most commonly think of when we discuss library resource-sharing networks. Library consortia—for shared catalog services, interlibrary lending, document delivery, and shared electronic licensing—are growing in influence and importance. However, library communities also work together in a variety of ways, both formal and informal, that go beyond, or underpin, consortium activities. What follows is a consideration of the many different ways in which library communities are becoming more closely interconnected.

The inherent capabilities of networked technology have presented libraries with opportunities to take their services to new levels. Libraries have been affected by general trends in computer technology. Libraries also share the enormous challenges of integrating new skills and methods, facing new sources of competition, and adapting to the rapid pace of technological change. *The 2003 OCLC Environmental Scan: Pattern Recognition*

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(Wilson, 2003) provides a useful consideration of the changing landscape and technology-related challenges facing libraries. *Library Networks in the New Millennium: Top Ten Trends* (Laughlin, 2000) is another valuable work that looks at the forces affecting the development of library networks. In that volume of essays Hyman (2000) addresses the rapid growth in library user expectations in a world where instant communication and high-speed mobile access to worldwide information is the norm. Both *Pattern Recognition* and Hyman (2000, p. 97) conclude that cooperation and collaboration provide libraries with essential tools for meeting the challenges of the future. *Pattern Recognition* quotes Reg Carr: "If the last few decades of library and information developments have taught us anything, then it's surely that the really significant advances, and the meaningful and lasting solutions, are cooperative ones" (Wilson, 2003, p. 83).

As technology presents libraries with many new challenges, it also provides collaborative tools to address these challenges. Shared online services in libraries have grown in step with increases in bandwidth and network reliability. We now take for granted network communication, universally available e-mail, listservs, RSS news feeds, blogs, and wikis. The use of these communication tools to focus the efforts of diverse groups is a central feature of the current advancement of library services through shared technology.

NEW SHARED TECHNOLOGY SERVICES

Integrated Library Systems (ILS) continue to be a key part of library consortium activity. New library online services are also becoming the focus of library sharing. In his article "Re-Integrating the 'Integrated' Library System" (Breeding, 2005), ILS watcher Marshal Breeding outlines the growing range of online services libraries are able to offer. Important new technologies like virtual reference, Open URL link resolving, federated searching, content management systems, and user direct document delivery services are good candidates for shared and cooperative delivery. There are important economic benefits to sharing the costs of computer infrastructure needed for such services and spreading the workload among many libraries. There is also the considerable added benefit of providing a more common experience to users from groups of libraries.

As new services are being added to the offerings of ILS vendors, existing library consortia are sharing a wider range of services. New services are also an incentive for new libraries to join consortia. For services such as user direct document delivery or virtual reference, there are great benefits to having very large groups of libraries participating. Sharing services among many libraries makes possible a level of service that could not be achievable by any single library. It is not surprising that Marshal Breeding also suggests that he is seeing renewed consolidation taking place in the ILS environment, as larger groups of libraries share centralized resources for a growing array of online services (Breeding, 2004).

STANDARDS AS A KEY TO RESOURCE SHARING

Development and use of common standards is one of the most important tasks that libraries perform collectively. Libraries have a long history of standards development previous to the development of the Dewey Decimal and Library of Congress classification systems (Straw, 2003).

Through adherence to standards, worldwide networks are created that successfully share resources, with little need for discussion among the participating agencies. Libraries exchanging materials via interlibrary loan need only follow agreed protocols to do so without the need for additional communication. In the same way, adherence to the Z39.50 search standard allows libraries and their users to routinely share information between their catalogs worldwide, without the need for any direct relationship or contact other than the reliance on a shared search standard.

In the online environment, standards are taking on new importance. Networked information services are increasingly based on automated interoperability, where transactions between libraries take place with the fewest possible steps, with little human intervention, and at computer transfer speeds. Automated methods are becoming essential to reducing the cost of library services and providing the speed of service that users have come to expect. New data, format, and procedural standards have become necessary. Much more closely applied standards are proving essential to making automated interoperability work reliably and effectively.

Library classifications systems and Machine-Readable Cataloguing (MARC) are major standardization achievements for libraries. The Z39.50 search standard was the first standard that allowed libraries to achieve the automated linkages that are becoming central to our networked services today. The release of the Z39.50 standard in 1988 was an important step, but equally important for the advancement of library networking was the creation of the Bath profile in 2000 (Lunau, 2003). Divergent implementations of the standard limited its usefulness. The uniform application of Z39.50 through use of the Bath profile has been as important as the application of the standard itself. This has proven to be the case with the MARC cataloging standard as well. It is an ongoing process to make the application of MARC more uniform (Library of Congress, Network Development and MARC Standards Office, 1998).

The National Information Standards Organization (NISO) is becoming a critical resource for library integration. NISO has been instrumental in development of many of the more important standards that are allowing the closer integration of library services. The Z39.50 search standard, the International Standard Serial Number (ISSN) numbering system, and the underlying standards behind MARC are NISO standards. More recently developed standards include the Open URL linking standard and the library Circulation Interchange Protocol (NCIP) (NISO, 2005a). NISO currently has task forces working on new standards for federated searching and cross-searching of multiple databases.

NISO is the information standards organization for a more general organization, the American National Standards Institute (ANSI). NISO is also a key player in the technical standards group (T46) for the International Standards Organization (NISO, 2005b).

The standards process itself is at every stage a collective activity. The standards organizations work through a broad process of consultation, with representatives from the information industry and from libraries. The final approval of NISO standards is voted upon by the organization's membership. Libraries and other organizations volunteer to act as Maintaining Agencies for each standard. For example, the U.S. Library of Congress is the lead agency for Z39.50, and NISO ILL is maintained by the Online Computer Library Center (OCLC). In addition to the organized standards process, interest groups and research communities form around individual existing and emerging standards. These informal groups are often as important as the official process in the implementation and advancement of standards.

In addition to the ISO/NISO/ANSI international standards system, many library organizations are active in developing standards. Counting Online Usage of Networked Electronic Resources (COUNTER) is an example of a single purpose standard-setting organization. COUNTER is an international nonprofit organization formed in 1992. It represents a large group of stakeholders including libraries and information companies. The group has worked cooperatively to implement standardized usage statistics for online journal databases. COUNTER built on the existing work done in this area, including guidelines developed by the International Coalition of Library Consortia (ICOLC) and the Association of Research Libraries (ARL) (COUNTER, n.d.). The International Federation of Library Associations and Institutions (IFLA) is particularly active in developing best practices and guidelines. ALA and its divisions are among the many other library organizations that are active in advancing standards and common practices in a wide range of areas.

INFORMAL STANDARDS

Libraries also share important resources through the use of a wide variety of informal standards. Of course, the process of standardization is not unique to the library industry. The Windows operating system or the Intel PC computer are common examples of informal standards.

One example of an informal standard in libraries is the software product EzProxy. Useful Utilities Company's EzProxy is one of the most popular means for libraries to offer their users remote access to the journal databases and other e-content resources that they license. It is considered a standard for this purpose. The software is used by over 1,500 library agencies in more than 35 countries and has recently seen its first users in China (Chris Zagar, personal communication, April 15, 2005). It has become a standard for

providing remote access to library e-content. Another example is Infotrieve Inc.'s Ariel software, which has become a standard for online electronic document transmission. Some 6,000 library sites around the world are currently included on the Ariel site list (Infotrieve, 2005).

Just as with official standards, important communities of interest form around commonly used software, methods, and services. The users of Ariel or EzProxy communicate to solve problems and share information and best practices. In the same way, libraries using any common application or a particular ILS system, document delivery software, metasearch tool, or link resolver form informal but very valuable information- and resource-sharing networks.

The use of XML markup language is another case of emerging standardization. Roy Tennant's *XML in Libraries* (2002) provides an excellent survey of the many ways XML can be useful in libraries. Major library system vendors, including Ex Libris, Sirsi, and Endeavor, have developed XML interchange features in their software to be used as the means of exchanging information with other systems. E-content vendors including Elsevier and Proquest have developed XML-based search interfaces as well. The use of this informally standardized markup language is allowing libraries to share XML methods and programming expertise. It also suggests possibilities for the creation of new formal interchange standards.

It is very common for important new developments in information practice to begin as informal standards and then be taken up by standards agencies and developed into more formal standards. This was the case with the Open URL linking standard, which was first developed at Ghent University and then used by the SFX linking software (Grogg & Ferguson, 2004).

Informal software standards are often transitory. The standard software or method for performing a certain task today is likely to change within a few years. It is also common for several informal standards to compete. One piece of software may be the common standard for one group of libraries in one region, while another competing application is favored by other libraries. Each software vendor of course strives to make its application the informal standard. This sometimes confusing competitive process has been the driving force behind much of today's innovative technology. One of the keys to this process of innovation is the widespread exchange of information and expertise by groups and individuals using particular software, services, or standards.

OPEN SOURCE AND LIBRARIES

Open source software is another example of collaboration at work in libraries. Eric Raymond's *The Cathedral and the Bazaar: Musings on Linux and Open Source by an Accidental Revolutionary* (Raymond, 2001) is a useful introduction to the open source community and its method of shared development and cooperative maintenance of freely available software. The

library community, with its inclination toward collaboration, has proven well suited to the shared method of software development. The open source software movement has a strong following in libraries.

Thousands of libraries around the world rely on common applications developed through the open source process, such as the Linux operating system, the Apache Web-server software, or My-SQL and PHP Web database tools. These open source applications have become the informal standard in many libraries, as elsewhere. Open source development of library-specific software is widespread as well.

The Koha ILS system is an excellent example of an open source library project (Koha Open Source Library Systems, n.d.). This application was developed in Australia in 1999 and is now used in over fifty libraries around the world. The reSearcher suite of library integration software developed by the Council of Prairie and Pacific University Libraries (COPPUL) in western Canada is one of the most ambitious and successful open source library projects (COPPUL, n.d.). The PINES network of 249 public libraries in the state of Georgia has also recently announced plans to develop a new open source integrated library system (Kenney, 2004). Eric Lease Morgan's "Possibilities for Open Source Software in Libraries" (Morgan, 2002) provides a useful introduction to the use of open source methods in libraries. The Web site of Open Source Systems for Libraries (OSS4Lib, 2005) is a prominent resource for learning about ongoing open source library activities. The open source movement in general is an important means for libraries to share software resources. Each individual open source project creates its own dynamic resource-sharing network.

CENTRALIZED INFORMATION SERVICES

Centralized services such as bibliographic utilities and union catalogs have long been an important focus of library cooperative efforts. As some centralized services like catalog copy utilities have declined in importance, new centralized services are emerging. Increased Internet bandwidth, increasing capabilities of Web services software, and the decreasing cost of server technology are making wider sharing of library services possible. A growing capability and willingness to act collectively are also contributing to this development. In a growing number of situations, nationally or internationally centralized library services are developing.

Internet search engines, particularly Google at present, have become very important centralized information services. Google's initiatives to expand the public Internet content have received a great deal of attention. These include the Google Scholar scholarly materials search engine and Google's partnership with prominent libraries to digitize library collections (Carlson & Young, 2005). Google is partnering with a large number of e-content vendors and indexing projects to make a growing volume of journal information available via public Web search.

Google's digitization projects have generated considerable controversy. Their efforts to expand the accessible content of the Web build on long-standing earlier cooperative efforts, notably Project Gutenberg. The recent announcement of a major digitization effort by national libraries in nineteen European countries is also noteworthy, particularly for the non-English speaking world (Farrell, 2005). Other search engines including Yahoo and MSNet are also active in expanding Web content. Centralized Web services in general are an area of strong business competition (Vogelstein, 2005). New players and new content services will no doubt continue to evolve rapidly on the World Wide Web. Web search engines will continue to emerge as one of the most important centralized information resources.

OCLC has long been a key provider of shared library services. Their Open WorldCat service is a major new development in centralized library services. OCLC has partnered with Yahoo, MSN, and Google in the Open WorldCat project, which will make over 50 million library catalog records from OCLC's WorldCat union catalog records searchable via Web search engines. OCLC also provides the means to link from a retrieved book reference to the Web searcher's local library (Mattison, 2005). In addition, both OCLC and Google are developing central services that allow individual libraries to provide links to their journal holdings. Through these services, users will be routed to the appropriate link resolver or library catalog to determine if resource references found on the Web are available in a local library (OCLC, n.d.; ResourceShelf, 2005).

Crossref is another important centralized service. Crossref is an industry organization with library membership that provides a central repository of location information to access e-journal materials available from over 1,400 publishers and societies. The service uses Open URL standard digital object identifiers to maintain up-to-date linking information for over 15 million articles in more than 11,000 journals available electronically (Crossref, 2005). Crossref can offer article- or journal-level Digital Object Identifiers (DOIs) and has recently begun offering linking to material cited by a retrieved article. Crossref is not intended to be a tool for direct patron searching. Instead it can be used in the background, by library ILS software and e-journal search software, to link from retrieved citations to available full-text content held by many different publishers. The creation of Crossref is an indication that online vendors and publishers see the benefit of working together rather than offering services independently.

RedLightGreen is the Research Libraries Group's (RLG) award-winning centralized Web accessible union catalog. This user-friendly library portal was developed with funding from the Mellon Foundation as a collaboration among RLG, Columbia University, New York University, Swarthmore College, and the University of Minnesota (Proffitt, 2004). Rather than working primarily through the Web search engines, RedLightGreen offers centralized searching of over 45 million titles from the RLG union

catalog. Through its easy-to-use portal interface, it provides links to local library holdings as well as citation assistance.

Shibboleth authentication is another example of a centralized service that will have a significant impact on libraries. Shibboleth authentication was developed as an Internet 2 project. It provides a method for vendors of e-content and institutions that license full-text content to validate authorized users in order to share information. Shibboleth ensures the security of materials traveling over the Internet while providing authorized users with easy, safe, and private access. This federated method of authentication requires content providers and users to work closely together and to share common methods of authentication and standards of security. It will provide a flexible and more secure replacement for current methods used to validate the use of content over the Internet (Needleman, 2004).

The possibilities for centralized information and library services are great. A growing number of information services can now be delivered as widely shared centralized services. Libraries worldwide are becoming more closely involved with these resources, including freely available Web resources and library consortium offerings. Greater connections are needed between freely available Web resources and individual library services and holdings.

VIRTUAL REFERENCE SERVICES

Virtual Reference Services are another application where the sharing of technical resources and workload is proving to be valuable. These services have developed rapidly and received considerable attention recently. The Library of Congress worked with the "Global Reference Network" and OCLC on the early development of online reference. This work led to the development of OCLC's popular QuestionPoint virtual reference software (Quint, 2002). A range of other software products has developed as well. A recent survey showed that seven prominent virtual reference software products are now being used by over 2,800 libraries around the world (Olivares, 2004).

The Virtual Reference Desk is a promising project sponsored by the United States Department of Education. It has assisted in the creation of a network of more than 100 "Ask a"-type virtual reference services. Many of these are nonlibrary projects offering reference-type information on a wide variety of specialized topics. The Virtual Reference Desk is a wide-reaching resource-sharing project that includes both libraries and other information-providing organizations (Virtual Reference Desk, 2002).

The process of establishing standards for virtual reference services is underway. Several organizations have developed best practices in this area. IFLA began a Digital Reference Standards project in 2001 to work with a wide variety of groups, including the Reference and User Services Association (RUFA), OCLC, NISO, and the Virtual Reference Desk project (Fullerton, 2002).

INFORMATION INDUSTRY AND LIBRARY PARTNERSHIPS

The publishing and information services industries are changing rapidly. Business mergers and partnerships are bringing about their own sort of resource sharing through consolidation. Major publishers such as Gale, Bowker, and Academic Press have joined with larger companies. The merging of the ILS company Endeavor with the publisher Elsevier, or the e-serials service company Serials Solutions with the e-content aggregator Proquest, are examples of formerly separate information services coming together. Libraries are being offered an increasingly unified and integrated range of services.

Online information vendors are involved in a growing array of partnerships, of which Crossref is just one example. The new services that are becoming available—federated searching, Open URL linking, and virtual reference—all depend on the use of common standards and methods and on close cooperation among e-content vendors. Both Proquest's director of platform management, John Law, and EBSCO's chief systems architect, Oliver Pesch, agree that even more standardization and cooperation between online information companies is needed (Grogg & Ferguson, 2004). It is not surprising that the metasearch company MuseGlobal prominently "showcases" its partnerships with major ILS vendors and e-content providers (MuseGlobal, 2005). In the same way, ILS vendor Sirsi lists eighty corporate partners on their Web site (Sirsi, 2005). The successful functioning of online products is increasingly dependant on cooperation.

Publishers and information services vendors are also partnering with libraries in a growing variety of ways. As vendors rapidly develop new services, partnerships between software vendors and the library community for testing and evaluating new products are essential. The Endeavor company promotes the collaborative approach taken to develop its software in partnership with library users. It lists over sixty libraries involved in "task forces" (Endeavor Information Systems, n.d.) working to enhance aspects of Endeavor services. Wide consultation and collaborative interaction with libraries have become the norm for information services companies. It is important to build communities of interest for their products. Online information, product-specific publications, user groups, and mail lists are common methods for training users and providing information. They are also important for allowing users to share knowledge and join in discussions, which result in innovations and enhancement of the vendor's products. Informal networks grow around both commercial and public domain software. The product's listserv often becomes a critical resource. The user community becomes an important force in application development.

The range of library-related partnerships and network relationships is diverse and far reaching. The relationships among nonprofit organizations, information vendors, and libraries have been instrumental in developing online information infrastructure in many parts of the world. Electronic

Information for Libraries (eIFL) is a particularly good example. eIFL was formed in 1999 as a joint project of the Sorus Foundation's Open Society Institute and EBSCO publishing, with the aim of fostering library consortia and e-content services in countries with limited online information infrastructure. eIFL has developed into an independent consortium providing e-content services in forty developing countries, particularly in Eastern Europe and Africa (Electronic Information for Libraries, n.d.).

PRESERVATION AND CONSERVATION PARTNERSHIPS

Another area where information industry and library partnerships have been particularly active is in digitization of print collections. A major example of such partnering is the Elsevier company's collaborative effort to locate, digitize, and preserve the complete archive of its print journals. Elsevier partnered with the National Library of the Netherlands and Yale University, in addition to many content-providing libraries, over a three-year period on this project (Elsevier Corporation, 2002).

Thomson Web of Science has undergone a similar process to identify and index 100 years of historical journal materials for their Century of Science project (Thomson Scientific, 2004). Thomson credits partners Trinity College Dublin and University College Cork and lists eight other major libraries and institutions for providing materials for this project. Another interesting text conversion project is the Early English Books Online Text Creation Partnership (EEBOTCP), which involves Proquest and Chadwyck-Healey, partnered with over 130 universities, in the digitization of early works in English (EEBOTCP, 2005). Both business and nonprofit partnerships are involved in digitization efforts. These partnerships are making it possible to preserve and manage worldwide collections, both paper and electronic, in ways that have never been possible before.

CONCLUSION

Libraries are working ever more closely with one another, with online information companies, and with other cultural agencies. They increasingly share infrastructure and human resources to offer a range of common services. They are participating in widely available Web-accessible centralized services. Libraries collaborate and exchange resources by sharing both formal and informal standards. They participate in the cooperative process for developing those standards. Libraries participate collectively in the continuing innovation of information software and services, both commercial and open source. They routinely share information on the use of common software applications, large and small. The sharing of ideas, expertise, and resources by wide-reaching, often voluntary and informal, communities of interest is central to the way libraries offer and further develop online services.

These activities have made libraries more interconnected and interdependent than ever before. Through this interdependence, libraries are moving well beyond organizing and offering user access to local bodies of material within their own buildings to ordering and providing access to ever larger, increasingly comprehensive, ultimately global bodies of shared material. As the number, type, and complexity of sharing relationships grow, libraries will need to draw the threads together to better focus the many important ways in which they work together to share resources.

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More Bang for the Buck: Increasing the Effectiveness of Library Expenditures Through Cooperation

DAVID F. KOHL AND TOM SANVILLE

ABSTRACT

The long-term strategy of the academic library community needs to focus on improved cost effectiveness rather than becoming preoccupied with the short-term effects of budget reductions. Fortunately, the rise of consortia and the maturing of the automation environment provide a conducive environment for substantial gains in the cost-benefit ratio over a wide range of library services. Examples of such gains in four key library service areas are described.

INTRODUCTION

At a time when the restraints on academic library budgets are universally painful and seemingly ongoing, it is easy to believe that the fundamental problem for academic libraries is retrenchment and cost cutting—easy, but wrong and short-sighted. The underlying focus for budgetary attention, whether times are flush or flushed, should be a concern to get the most value out of each dollar spent. In the last decade and a half the convergence of two explosive trends—the rise of digital information and consortial organization—have provided radical new possibilities for improving libraries' abilities to get more value out of each dollar spent. Such a positive approach to the budget can also provide a strong implicit argument for preserving or even increasing the library's share of limited university resources. But whatever the library budget ultimately, the rightful concern for present-day librarians is the potential these two new developments have to increase the value received for library money spent. OhioLINK, a consortium of Ohio academic libraries, as well as other consortial examples, provide illuminating instances, if not a comprehensive survey, of how such an approach to increasing cost effectiveness can work.

Four rather different areas of library service agendas can illustrate how

creative use of these two new developments can improve the cost-benefit ratio of library expenditures: sharing printed books, storing print materials, providing access to the journal literature electronically, and providing access to electronic versions of library special collections, faculty publications, or university projects through a consortial institutional repository. In each of these areas, OhioLINK libraries have dramatically expanded access while at the same time improved the cost-benefit ratio of library services through use of a consortial approach combined with appropriate digital technology. It is important to note that the end game for each of these projects is not to return money to the university administration but to improve and expand services to the user community.

SHARING BOOKS IN A COST-EFFECTIVE MANNER

Books in printed form continue to represent a vast and valuable resource for most academic libraries. Although the idea of using digital technology to share books by putting printed books online goes back more than a decade, and recent announcements by Google and its library partners suggest the first realistic expectation that such an approach might actually come to pass,¹ replacing print books with digital materials on a widespread basis still remains a future possibility. In the meantime, the printed collections held by academic libraries may be in many cases the most monetarily valuable single item owned by a university. Some years ago, for example, when it became necessary to establish a monetary value for the library collection at the University of Cincinnati (UC) for insurance purposes (an intellectually foolish but fiscally required exercise), the resulting value was \$117,674,821.² Built up over time, academic library print collections universally represent a huge university or college investment.

Ironically, the larger and intellectually richer the collection and its attendant larger acquisition costs, the lower the cost-benefit ratio to the institution, since per title use of large collections is quite small. An informal study at the University of Illinois–Urbana Champaign prior to installing compact shelving in the main stacks, for example, showed that only around 1 percent of the main stack collection was circulated in any given year, while an earlier landmark study of collection use at Pittsburgh suggested that many research books were acquired “just in case” and languished on the shelves, with almost 40 percent of new acquisitions not circulating in seven years (Galvin & Kent, 1977).³ Even in small, ostensibly high-use collections, the books linger on the shelves. A 1977 study of book circulation at Columbia-Green Community College showed that only 35 percent of the books circulated in a fifteen-month period (Ettelt, 1978). Attempts to leverage the large investment in these collections and expand access to local patrons through interinstitutional borrowing privileges for faculty and graduate students or through interlibrary loan (ILL) were useful steps but represented a negligible increase in use compared to local borrowing. In

the case of ILL, such a strategy of sharing represented an expensive solution, at a combined \$31.00 per transaction for the borrowing and lending institution (Jackson, 1998).

The rise of consortia in the early 1990s and the relative maturity of library bibliographic automation, which allowed real-time knowledge of not just library holdings but library circulation records as well, opened up new possibilities for taking advantage of the past huge investment in printed books as well as increasing the efficiency of developing collections. There are three basic principles: (1) it is much cheaper to make low-use and marginal books available to local patrons by borrowing from other institutions rather than by purchasing them; (2) substantial sharing among consortial members requires major reductions in the unit cost of borrowing and major increases in the ease and speed of sharing materials; and (3) it is possible to substantially improve the cost per use of a book title as well as increase the richness of the collection by transferring money spent on unnecessary duplication to purchase of new titles.

There are several examples of how this can work in practice. In the case of OhioLINK, we have managed to increase the effective collection size of each participating institution to 43,500,000 items, including 9,259,000 unique titles. We have dramatically reduced the traditional ILL costs between member libraries by using patron-initiated requests and a staffing context that requires little more than low-cost student labor. Based on an in-house study at the University of Cincinnati, the round-trip delivery costs using student labor came to less than \$1.00 per requested and returned item. We have forty-eight-hour turnaround for 75 percent of interinstitutional borrowing requests and seventy-two-hour turnaround for 95 percent of our interinstitutional borrowing requests. A variety of cooperative tools and approaches have been developed, and libraries are experimenting with coordinated collection development in order to reduce unnecessary duplication and expand overall collection depth and breadth.

How does a highly automated consortial environment bring this about? Consortial collections can be large and grow at a prodigious rate since a book added by any consortial member is in effect added to everyone's collection. The key to a practical virtual collection, however, is not the size of the collection per se but the ease, speed, and expense of actually using each other's materials. OhioLINK, working with Innovative Interfaces, Inc., developed a real-time consortial circulation module that allows a patron in any OhioLINK library to search, view circulation status in real time, and request materials held in any member library. Such searches and requests are called "patron-initiated circulation" rather than ILL since they do not require the staff or procedures of a traditional ILL loan. All requests for materials between libraries are initiated directly by the patron and mediated by automation technology since all such requests are for known items in known locations. Since the patron can see the circulation status of the

desired item, lost, circulating, or restricted items can be ignored and only those items that are truly available are requested. A notice is generated at the holding library, which prompts retrieval by a student assistant, who does a preliminary checkout to the requesting patron and deposits the book in a courier bag for delivery to the patron's home library. At the patron's home library the checkout is confirmed when the item is picked up by the patron.

In terms of faculty and student response, patron-initiated circulation is probably the most successful program undertaken by OhioLINK libraries. Acceptance has been enthusiastic and use vigorous. Beginning in 1994 with 6 library members, patron-initiated borrowing now includes 85 institutions and has risen from 77,000 items per year to 756,000 items per year. By transforming interinstitutional borrowing from a marginal to a core activity, it can be truly said that every academic library in the state of Ohio has increased its effective collection size to 43,500,000 items. It is particularly worth noting that highly automated sharing of consortial print resources is not only much more cost effective than traditional ILL but is much more cost effective than each library purchasing even a fraction of that size of collection individually.

It is even possible to increase the cost effectiveness equation by fine-tuning the collection development process. While establishing in-depth collection specialty responsibilities among OhioLINK member libraries is an evolving process, a working outline of the mechanism is emerging. Developing consortium purchasing mechanisms within Yankee Book Peddler's GOBI2 administrative system allows library collection development specialists to see what books other consortial members have already purchased. This provides a voluntary mechanism likely to reduce unnecessary duplication in the consortial collection. The resulting savings can then be used to extend the depth and breadth of collection coverage. Already reports from OhioLINK selectors indicate this is happening, and new acquisition rules that account for copies already held by others are creeping into the system. Data from the patron-initiated circulation program is revealing in terms of suggesting the scope for such redeployment of funds. Thirty-nine percent of such requests have five or more available copies at the time of request. There is clearly unnecessary redundancy in the system; funds could be put to better use buying a wider range of materials.

OhioLINK is not alone in discovering the increased cost effectiveness of sharing printed books rather than purchasing them. One prominent consortium that has published a report on a similar project is the group of Borrow Direct partners. Unlike OhioLINK, these consortial members do not share a common automation system and must operate across state lines. Still, they have been able to drive the sharing costs quite low (down to \$10.00 per transaction). They report many of the same advantages in extending the range of resources available to their patrons in a timely and convenient way while significantly improving the cost-benefit ratio of

their book collections through sharing rather than purchasing (Nitecki & Renfro, 2004).

In short, in a predigital world it was necessary for academic libraries to function as largely self-contained repositories with all the attendant inefficiencies and cost-benefit problems noted above. Increasingly mature automation technology has made interinstitutional searching a “known item” in a “known location” experience. It has made it possible to realize considerable savings and to increase the speed and reliability of the former ILL experience so that interinstitutional sharing can be a major, rather than negligible, element in library circulation. Solving such problems in a consortial environment allows librarians to deliver in practice what was formerly only a theoretical hope—a reliably working virtual collection offering a huge range of resources in an improved cost-benefit environment.

STORING BOOKS IN A COST-EFFECTIVE MANNER

Building libraries is an expensive proposition, in part because they require such a variety of spaces—book stack space, reference space, carrel and study space, a variety of technical services spaces, office space, and so on. While the need for these spaces is declining or static in many academic libraries as building traffic, cataloging units, and numbers of library staff generally decline, the need for stack space reliably continues to increase year after year. Although many librarians may be under the impression that monographic purchases have been declining due to shifts in library budgetary resources to support scientific, technical, and medical (STM) journals, in fact the average number of books purchased by Association of Research Libraries (ARL) members has steadily increased, though with occasional pauses to regroup, over the years. From 1989 to 2003 the average number of books purchased by an ARL library has risen from 34,500 per year to 41,836 per year—a 21.3 percent increase in the last fifteen years (Association of Research Libraries, 2003). Given this trend, it has become clear to library administrators and funding agencies alike that the most practical solution to this lopsided pattern of space needs is the construction of specialized storage facilities devoted exclusively to the efficient storage of physical library materials—primarily books but also bound journals, government documents, and even archival records.

Although such specialized buildings are not always associated with consortia (some of the largest libraries such as Harvard and Yale have their own exclusive, high-density storage facilities), the history and general trend of libraries is to approach the construction of such facilities as a group (consortial) project. The first storage facility independent of a particular library in the United States was the New England Depository founded in 1942, followed shortly thereafter in 1951 by the better-known Center for Research Libraries (originally named the Midwest Inter-Library Center until 1965).

While these pioneering efforts provided useful experience and lessons, the trend for highly specialized and physically separate high-density storage units began in earnest in the 1980s. Characterized by a highly specialized off-site building; major, rather than token, transfers of library material; digital (Web) access to repository holding records; and facility ownership/funding generally based in a consortium, a variety of building models emerged. The University of Michigan retrofitted a preexisting building to create the Buhr Shelving Facility in 1981, and the University of California system organized their buildings around the use of standard compact shelving in 1980, but the dominant model was pioneered by Harvard in 1986—a large cube with ten-story stack ranges, shelving by size, and a small associated processing area. As well as being the dominant model, the Harvard approach is the most radical in its single-minded focus on storing the largest amount of material in the most compact space.

The difference between earlier repositories and the post-1980s models can be most clearly seen by comparing the Center for Research Libraries (CRL) with both a Harvard and non-Harvard model of high-density storage. CRL, for example, has a present collection of 3.5 million volumes. This may seem like a lot, but consider that this collection was built over a fifty-one-year period from an approximate average of sixty members nationwide. This is the equivalent of an average of 68,627 volumes being transferred annually from roughly sixty members, or just over a thousand volumes a year per member. Since the CRL has also functioned as a common buying club for some materials, this means even fewer materials being transferred.

In contrast, the southwest Ohio repository (based on the Harvard model and one of five OhioLINK high-density storage facilities), serving just four academic libraries, has developed a collection of 1.5 million volumes in under eight years. This is the result of a transfer rate of 187,500 volumes per year for four libraries or 46,875 volumes transferred annually per library. This represents an increase in transfer rate of over 40 times (40.97) that at CRL. Such large transfer rates are common. The first module of the California Northern Regional Library Facility (a non-Harvard model) was filled with 3.1 million volumes in six years (University of California, Berkeley, 2005). With four large member libraries transferring materials, that comes to 129,167 volumes annually per library. Although the transfer rate declined while filling the second module—2.37 million volumes over ten years for a 59,250 volume annual transfer rate per library—even this lower figure is still well above a 40 times greater transfer rate than that experienced by CRL. Incidentally, both the northern California and the southwest Ohio repositories are well along in planning their third repository module. In short, these repositories are not a one shot, one time solution but an ongoing way of life for the foreseeable future.

In addition to the very real advantages of storing printed materials under optimal storage conditions (controlled light, temperature, humidity), there are a number of other important advantages as well. The first is the efficiency of the shelving. Shelving by size in oversize stacks dramatically increases the number of materials that can be stored. Minnesota studies indicate a 40 percent gain in shelf storage capacity (University of Minnesota, 2005). A second important point is cost. An informal review of comparative costs by Orbis, a coalition of academic libraries in Oregon and Washington, indicated that the construction cost per volume was \$3.75 for a high-density facility compared to \$13.39 for traditional campus library construction (Murray-Rust, n.d.). Yale reports an even higher rate of savings, calculating that off-site storage is one tenth as expensive as traditional library open stacks housing (Block, 2000). The lower costs of off-site land alone can be a significant factor. For what they do, the modern repositories are relatively cheap to build and very cheap to maintain.

A third important point is that these repositories are basically local, serving a relatively small number of nearby libraries. This is a very important feature when the library tries to convince local faculty to agree to let "their" materials be moved to another location. Any library director will agree that "down the street" is a much easier sell than "across the country," although neither is a walk in the park. And, of course, retrieval speed, typically one to two days based on anecdotal reports, is also enhanced with a local, rather than national, facility.

Although the data is still anecdotal, there appear to be other cost savings as well. Chief among these can be a substantial reduction in binding costs for journals. Material available via the online journal collection JSTOR or material that is traditionally low use after a year or so can simply be shrink wrapped and stored in the repository. When patrons request such an item, it is either already available online or it can be faxed or emailed to them by depository staff.

As in the case of patron-initiated circulation, the key to successfully taking advantage of the substantially reduced storage costs of off-site, high-density storage is reliable online bibliographic control, a convenient request process, and speedy delivery of materials. While consortial involvement is not absolutely necessary, as noted above it does share the building and automation costs over a larger pool, and few libraries need to move more than 100,000 volumes a year off site. While more detailed studies would further and more definitely identify the exact size of the improvement in the cost-benefit ratio, the present evidence is already compelling.

EXPANDING ACCESS TO ARTICLES

Possibly the most well-known intersection of automation and consortia has been the "Big Deal," or variations on group electronic journal licensing, with the resultant tremendous increase in journal literature access

for patrons and the leveraging of the library collection's dollar that this model of journal purchase has made possible. Like all breakthroughs, it has at times been misunderstood, and it has required fine-tuning to meet changing external conditions and inherent structural problems.

The simplest explanation of the traditional Big Deal, and its variations, is that a consortium contracts with a publisher, traditionally over a multi-year term, to receive all or a substantial portion of a publisher's titles for all members of the consortium in electronic format. Additionally, each individual library continues to receive its particular subset of print copies. The price for this arrangement is calculated as the cost of the combined members' print subscriptions plus an affordable surcharge as an incentive for the publisher. Such an arrangement not only substantially increases the journal literature available to consortial members but also allows the possibility for making a strong statement to administrators about improved cost effectiveness—a reality that a number of libraries and consortia have turned to their advantage (Kohl, 2003).

The most common misunderstanding involving the Big Deal and its variants is that it is a mechanism to save money and reduce library expenditures. Although such a misapprehension is perhaps understandable, it is, of course, completely wrong. The Big Deal is (1) primarily a means of substantially improving the purchasing power of the consortium and its library members by delivering proportionately more titles per dollar spent (similar to shopping in bulk at Costco); (2) a method to maximize use via electronic delivery over traditional and limited (basically rationed) access in print; and (3) a means of making a more compelling argument for increasing library and/or consortial funding. The underlying rationale of the Big Deal for libraries was that, by paying a little more, they could get a lot more; it has become the overwhelmingly preferred mode of journal purchase for consortia worldwide.⁴

Of course, individual consortial circumstances, as well as the changing landscape of journals in a digital world, have resulted in endless variations on the Big Deal theme. Probably the biggest and most difficult external adjustment to the Big Deal model was the advent of flip pricing, namely, shifting the ongoing group base cost from the collective print spend with an electronic add-on to an agreed significant group cost for licensing of the electronic titles with print copies both priced marginally and maintained discretionarily. As both libraries and publishers increasingly move into a digital journal environment, basing Big Deal pricing on fixed print spending has become increasingly problematic and divorced from any recognizable reality. As the publishing and library worlds change, an evolutionary and pragmatic restructuring of Big Deal pricing continues to evolve.

A more fundamental and long-term problem, however, was inherent in the bulk purchase approach of the Big Deal itself. If all of a publisher's titles are purchased, the Darwinian quality of the marketplace as reflected

by academic selection is defeated. An endless number of new journals could theoretically emerge without regard to academic quality or merit. Given the steady increase in academic journal titles and journal content, even under the gentle Darwinism of title-by-title selection, any further acceleration in new titles is alarming. This is especially so when considering the concomitant increase in expenditures likely to be expected by publishers. Lowering of academic quality is a concern if new venues for publication open up too rapidly. A mechanism for restoring some balance and discrimination is desirable and, indeed, has already been tried and described elsewhere (Gatten & Sanville, 2004).

Of primary interest, however, are the specifics of how the Big Deal actually worked to leverage the expenditure of library funds while increasing access to the journal literature. Critical to understanding the significance of the Big Deal is the context prior to the deals, namely, that relatively modest access to the full range of journal literature was being provided by libraries. The accumulated print subscription histories of journals published by academic publishers of the thirteen original core OhioLINK libraries was revealing (see Figure 1).

On average, only about 25 percent of the potentially academic titles were being made available to Ohio's university patrons. Even the largest institutions with the most complete collections provided only limited access. Ohio State University, whose ARL ranking for "total journal titles" has consistently placed its journal collection in the top thirty in North America, had only a bare majority of the titles, while the University of Cincinnati, with the second-largest journal collection in the state, had a bare 40 percent. Figures revealing such lacunae began to suggest not highly selective collections but surprisingly limited ones.

As the philosophy of the Big Deal began to take form in Ohio, two key threads were intertwined. The first was a concern to substantially increase access to the potentially useful journal literature given the deficit we had discovered; the second was to replace the idea of the librarian as resource gatekeeper with the concept of the librarian as "gateway." In other words, rather than trying to prejudge what academic library patrons needed and wanted and then ration out a selection of titles, the idea was to provide as much of the journal universe as possible and let the patron decide what was useful. Such a philosophy seems particularly appropriate for the new world of electronic information, where patrons can quickly traverse a very broad spectrum of content.

Considering the 25 percent average print subscription levels in universities, a Big Deal provides on average a fourfold increase in accessibility. For four-year liberal arts colleges with much lower subscription levels, the expansion can easily be twentyfold. For community colleges who traditionally have miniscule journal collections, the increase in intellectual resources is off the charts.

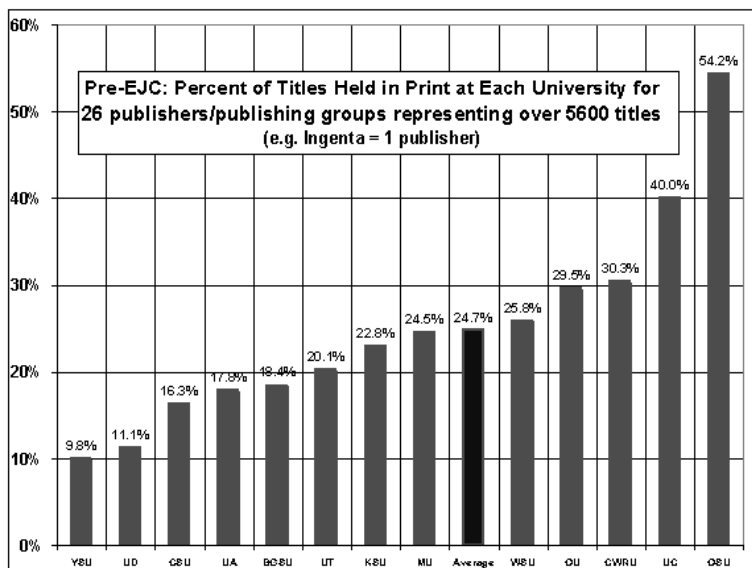


Figure 1. Before the Electronic Journal Center: Percent of Titles Held in Print at Each University

Note: The titles in the EJC are for twenty-six publishers/publishing groups representing over 5,600 titles (for example, Ingenta = one publisher). The institutions represented are Youngstown State University (YSU); University of Dayton (UD); Central State University (CSU); University of Akron (UA); Bowling Green State University (BGSU); University of Toledo (UT); Kent State University (KSU); Miami University (MU); Wright State University (WSU); Ohio University (OU); Case Western Reserve University (CWRU); University of Cincinnati (UC); and Ohio State University (OSU).

Of course, this increased access (keep in mind that the increase is only to digitally accessible titles) has a price, but it is a relatively small one. Since we were already supplying only what we could afford of the likely core journals of interest to our patrons, the increased access had to be heavily discounted by the publisher to be attractive to the library community. In these cases the increase in base cost is typically around 5 percent to 15 percent. There is a dramatic expansion in access with only a marginal price increase. This leads to a dramatic improvement in the effective average per title cost across the whole package. If the base print costs and original print titles are excluded, and the cost of the new titles alone is calculated, based only on the increase it is clear that the new titles have been purchased for almost pennies apiece. However calculated, such deals clearly give a substantial boost to the collection cost-benefit ratio.

It is important to note that initially there was concern both within and outside of OhioLINK that while the Big Deal is a great bargain for libraries, a bargain on something that is not needed or used is no bargain at all. In other words, there was concern that such dramatically expanded

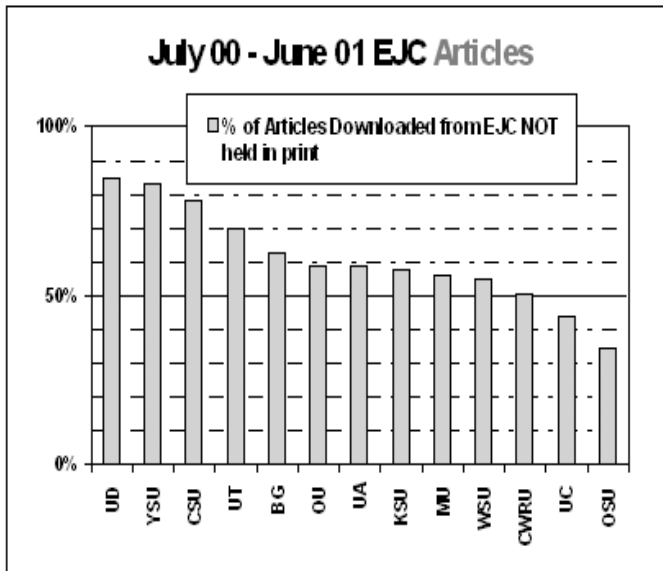


Figure 2. Percentage of Articles Downloaded from EJC Not Held in Print, July 2000–June 2001

Note: The institutions represented are University of Dayton (UD); Youngstown State University (YSU); Central State University (CSU); University of Toledo (UT); Bowling Green State University (BGSU); Ohio University (OU); University of Akron (UA); Kent State University (KSU); Miami University (MU); Wright State University (WSU); Case Western Reserve University (CWRU); University of Cincinnati (UC); and Ohio State University (OSU).

access, even at a very low rate, was unnecessary and unneeded by library patrons. A series of studies was conducted to determine usage of the new materials, particularly as compared to usage of the titles originally received by individual libraries prior to the Big Deal. As Figure 2 indicates from one such study, there was substantial use of the new materials among the universities.

In fact, as a group the use of the new titles was greater than the use of the previously subscribed titles. A quick check showed that the reason for this seemingly surprising figure, was not that the titles formerly held in print received less per title use. In fact, on an average basis they received significantly more use. However, the number of new titles was so great that even with a lesser per title use, the aggregate overwhelmed the combined use of the print titles. In other words, each of the newly electronically accessed titles individually contributed less use than the print held titles, but there were so many new titles that it still added up to more overall usage. It may help to keep in mind that we went from 25 percent of the title universe to 100 percent of the title universe, thus making new titles the vast majority of titles available to library patrons. Table 1 shows current evidence that the

Table 1. Use of the Titles in the EJC by Library Type in 2004

Library Type	Minimum	Average	Median	Max
University	3,877 (66.8%)	4,797 (82.6%)	4,968 (85.6%)	5,590 (96.3%)
Community College	582 (10.0%)	1,401 (24.1%)	1,320 (22.7%)	3,094 (53.5%)
Private College	112 (1.9%)	1,816 (31.3%)	1,883 (32.4%)	3,013 (51.9%)

Note: $n = 5,806$ titles accessible.

wider range of digital journals continues to be extensively used, providing ongoing validation of the decision to expand journal access.

It was also useful to note, in light of fine tuning the Big Deal, that the use patterns of individual journals followed a modified 80-20 rule, with 30 percent of the journals providing 80 percent of the use and, more significantly, 23 percent of the journals providing 1 percent of the total use. Perhaps most importantly of all, in a digital world we know exactly which titles these are (see Figure 3).

OhioLINK and other consortia continue to develop still evolving models of journal purchasing that allow libraries to substantially leverage their collection expenditures while dramatically increasing access to the universe of journal literature. The primary intent is not to solve immediate library

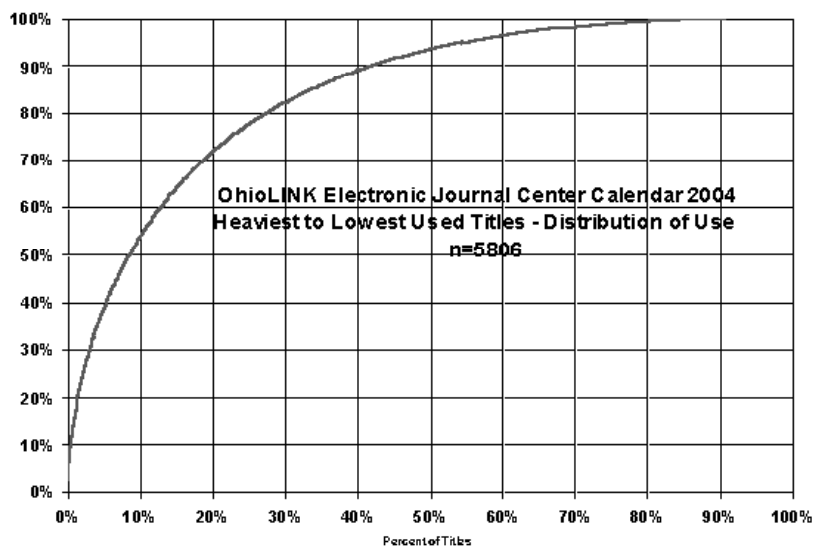


Figure 3. Distribution of Use of EJC Titles, 2001: Heaviest to Lowest Used Titles

Note: $n = 5,808$.

budget problems by saving money but to allow each library to substantially increase the journal access received for money spent, thereby advancing the library's core mission of improving access to academic resources.

INSTITUTIONAL REPOSITORIES AND DIGITAL LIBRARIES

Equally important as the previous three areas (but more difficult to quantify the full impact of) is the emerging concept of establishing digital institutional repositories to house and make available scholarly resources. Part of the problem of providing solid quantifiable data is the newness and evolving nature of the concept. Still, even if the cost data are not yet entirely locked down, there are strong logical indicators why, with today's automation, consortia can expect to enhance both the cost and the benefit sides of establishing and maintaining institutional repositories. Here we use "digital institutional repository" to refer to a vehicle housing all varieties of campus-produced intellectual content, such as individual faculty or academic department collections, library special collections, teaching aids, faculty or institutional special projects, and the like, not just scholarly working papers and articles.

From lessons learned in the operation of established consortium services such as OhioLINK's Electronic Journal Center and database hosting, parallel strong economies of scale exist for consortial institutional repositories in terms of staffing, equipment, software, maintenance, and development. Being able to spread the operating and development costs among multiple libraries minimizes duplication of effort, builds a facility that all members can use, and creates a collective body of content. While some libraries may have the individual ability to mount an institutional repository, they seldom can do so in as effective, efficient, or intellectually rich a manner as a consortium. And, of course, for many smaller or less affluent institutions, creating and supporting their own repository is simply out of the question.

Additionally, there is a further factor important now and likely to remain so for some time in the future. Search engines still have a limited ability to completely and reliably identify significant scholarly resources, which are widely dispersed institutionally and often reside in a complex multitude of data formats. While the advent of Google Scholar and IBM's recent announcement about developing a search engine that is independent of data formats is encouraging, Web searches for reliable and widely dispersed academic resources remain problematic. Going to a reliable site is still a useful strategy, but only if the site is content rich, simple, and reliable to use. In this sense, a consortial approach to an institutional repository can have important advantages over single institutions by providing rich content, standard data formats, and a common look and feel.

The importance of groups of libraries to the creation of rich data content cannot be underestimated. OhioLINK has in operation a first-generation

institutional repository known as the Digital Media Center (DMC). While it does not have fully developed administrative functionality that makes content entry and control easy at the institutional level, these shortcomings will be addressed in a second-generation platform that more closely fits current institutional repository definitions and expectations. Nonetheless, OhioLINK has a number of examples in the DMC that begin to illustrate the extraordinarily wide range of research and pedagogical resources that an institutional repository can provide.

At the request of graduate school deans across the state, OhioLINK developed an Electronic Theses and Dissertations Center (ETD). It provides a well-supported site for Ohio academic institutions to voluntarily deposit the theses and dissertations (and even senior honors papers) of Ohio students. Available since July 2001, its adoption on campuses is primarily a matter of local interest and culture. Growth has accelerated in the past two years as several large universities have begun to require electronic submittal of theses and dissertations. Even so, at this point there are only six universities and a handful of smaller schools inputting papers. Still, we have over 4,400 full-text documents, far more than the 1,400 records our largest contributor holds. As a consortium we offer a richer collective resource at a fraction of the cost of individual sites.

Of particular interest in terms of the importance of constructing a data-rich site for institutional repositories is the OhioLINK experience with ETD. As Figure 4 shows, the size of the database has grown in a regular and steady manner, but the use pattern has been somewhat different. For the first fifteen months for which we have use data (beginning January 2003), monthly use has fluctuated but demonstrated an overall gradual growth, with monthly downloads during that period ranging from 1,651 to 6,290 and averaging 3,696. Then in April 2004 harvesting to other Internet ETD sites began. For the following eight months, the most recent for which we have data, the monthly downloads have ranged from 7,086 to 20,036 and averaged 12,925 per month. Not surprisingly, worldwide access brought dramatic increases in use.

Foreign Language Digital Videos is a collection of brief foreign language video clips of native speakers sharing everyday experiences. These videos are produced by the ViewPoints Project of the Five Colleges of Ohio consortium. There are over 270 such clips—providing spoken examples of such varied languages as classical Arabic, Swahili, and Mandarin Chinese—now available in this growing collection. Cooperatively produced and collated into the DMC, it becomes a useful resource, accessible to the world, on an efficient basis.

We have a growing collection of historical and archival material supplied by faculty or libraries. These definitely represent just the tip of the iceberg of the intellectual assets that could be placed in a statewide repository: historic maps of Akron and Summit County, Ohio, contributed by the University of

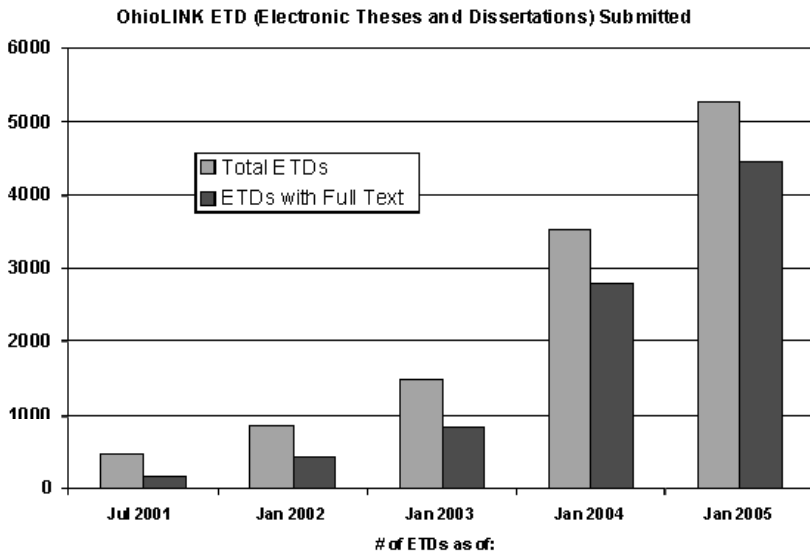


Figure 4. OhioLINK Electronic Theses and Dissertations Submitted

Akron; Lake Erie's Yesterdays, photos of the Erie Islands and Lake Erie's western basin; papers from the Rutherford B. Hayes Presidential Center; National Underground Railroad Freedom Center documents related to slavery, abolition, and emancipation; E. W. Scripps Papers 1868–1926, containing letters and photos from the Scripps archive at Ohio University; Wright Brothers photos documenting the invention of the airplane and the lives of the Wright family from Wright State University; and more.

Similar collections have been submitted to our Social Sciences Digital Media. This collection contains images and other media related to the social sciences. Currently, the database contains two collections: Greek and Latin inscriptions (digitized squeezes, that is, accurate paper impressions) from Ohio State University, and Mayan archaeology digital photos from Oberlin College. Likewise, our Science Digital Media contains digital videos and images related to the sciences. Currently, the database contains such institutionally based collections as dolphin embryo digitized slides from the Northeastern Ohio Universities College of Medicine; forestry photos from Ohio State University; geology photos from Oberlin College; reproductive physiology animations from the University of Cincinnati; digital animal sounds (for example, thousands of identifying bird songs) from the Borror Laboratory of Bioacoustics at Ohio State University; and others.

Finally, our Art and Architecture Digital Media includes art and architecture images from the following institutional sources: images from the Akron Art Museum; art and architecture from the University of Cincinnati; and Works Progress Administration prints by Cleveland artists from the Special Collections at Case Western Reserve University.

This is just the tip of the iceberg. The variety and richness of useful academic resources that are locally generated or locally relevant and can find an appropriate home in a consortial institutional repository is far greater than many of us have imagined. This material gathered together at a single consortial site can contribute to the development of a critical mass, necessary so that an individual institution's contributions are not lost through dissipation in multiple, local sites.

To be sure, other groups and institutions are active in these repository developments. All the libraries experimenting with D-Space are a prime example. The e-Repository of the California Digital Library is a fully functioning site to house the papers of the University of California faculty. A number of libraries are using the Online Computer Library Center's (OCLC) Content DM to house local digital collections. In the end, as this experimentation continues, can the evolutionary process of adoption be quickened, made to include more institutions, be accomplished more cost effectively, and result in richer sites if consortia act to create and operate these repositories? Will this result in more exchange across repositories because there is more likelihood of standards compliance, easier harvesting, federated searching, and linking? As in the other areas discussed above, it seems likely that institutional repositories represent an arena ripe for cost-effective consortial development and exploitation.

In conclusion, the fortuitous rise of consortia and the maturing of library automation offer libraries a wonderful set of opportunities to not only continue and expand their mission of providing access to the world's scholarly resources but to do so in an increasingly cost-effective manner. Becoming more efficient is not the same as saving money and, as we have seen above, at times it requires more money to achieve a heightened cost-benefit ratio. But improving the value received for the cost paid can never be a wrong strategy and represents a solid basis for advancing into the future.

NOTES

1. Project Gutenberg, for example, began in 1991 as a volunteer community project to bring printed books into the online environment and was followed by repeated and generally unsuccessful attempts to develop e-books on a widespread basis. Recent announcements by Google and a cohort of five major libraries suggest that both the interest in and process for digitizing books may finally start to enter the mainstream in a serious way, although many questions still remain.
2. Given that UC falls roughly in the middle of the ARL rankings for total volumes held suggests that this considerable figure is reasonably indicative of the general level of investment in research print collections.

3. For further and more complete information on this study, see Kent et al. (1979).
4. An Ingenta Institute report suggests that 50–60 percent of library e-journal purchases are a result of consortial deals. This is likely low since straw polls at the Thessaloniki (2002) and Copenhagen (2003) ICOLC meetings indicated almost universal participation in and support for the Big Deal approach to e-journal purchase by consortial delegates (Ingenta Institute, 2002).

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Closing the 95 Percent Gap: Library Resource Sharing for People with Print Disabilities

MARY ANNE EPP

ABSTRACT

Experts estimate that only 5 percent of the world's publishing output is made accessible in alternate formats for people who cannot use print. While some popular commercial digital audio and textual products are available to people with print disabilities, many people do not have equal access to reading materials and other resources. People who cannot use print due to a visual, physical, neurological, or perceptual disability need libraries to provide the equitable access. Libraries need strategic partnerships, improved public policy, and international agreements to fulfill the promise. Equity laws, union catalogs, new technology, standards for production and resource sharing, postal subsidies, and commercial production of alternate formats have all helped. This article focuses on key elements that affect library resource sharing for people with disabilities in the United States, Canada, and the United Kingdom. Challenges include attitudes, organizational isolation, diversity of alternate formats, nonadherence to standards, inaccessible online services, an uncooperative publishing industry, inconsistent access to equipment, and inadequate training. Recommendations are made to improve the legal framework, develop sharing library communities, and apply universal design principles.

INTRODUCTION

"Libraries have historically served as our nation's great equalizers of knowledge. In today's increasingly diverse and complex information environment, their services are needed more than ever" (ALA, n.d., p. 3).

Yet, this equity does not extend to those who are print impaired: people who cannot use print due to a visual, physical, neurological, or perceptual disability. Experts estimate that only 5 percent of the world's publishing output in English is ever made accessible in alternate formats for people who cannot use print (Canadian Library Association Working Group, 2005). Some of this reading material can be provided by mainstream popular audio books and accessible e-texts that are available to consumers either online or as digital products, just like a bookstore or online shopping channel. However, for people with print disabilities who cannot afford to pay for the consumer products and do not have computers, this marketplace model bars them from full participation in the information society (Kavanagh, 2002).

Despite decades of promoting equity in human rights through legislation, the 95 percent gap in alternate format accessibility for people who cannot use print is still hard to bridge. Resource sharing among libraries is a logical way to proceed. Although some library networks have developed innovative partnerships with private producers, achieving the "library without borders" to meet the "hidden demand" has had significant challenges. This article focuses on ways in which libraries are working collectively to address this issue. It also considers the issues that need to be dealt with in a more collaborative way. These include both advocacy and service delivery issues at the local, national, and international levels. Examples from the United States, Canada, and the United Kingdom will highlight the successes and the major challenges of the collaborative approach to resource sharing.

The International Federation of Library Associations and Institutions (IFLA) says "as information and documents are located all over the world, good libraries have always functioned as part of national and international networks. All libraries for the blind should be aware of collections held in other libraries and borrow less popular items from these sources" (Kavanagh & Skold, 2005, p. 31). The literature shows that successful libraries are working together to address the obstacles by encouraging interorganizational collaboration, planning for diverse alternate formats, developing standards, encouraging accessible online services, providing access to adaptive technology, and, perhaps most importantly, developing training strategies.

FOUNDATIONS OF RESOURCE SHARING RELATED TO ALTERNATE FORMATS

To understand the context of resource sharing related to alternate formats, this article will first lay the foundation by identifying factors that affect successful collaborative services: diverse customer needs, information-seeking behaviors, social and professional attitudes, the "digital divide," proliferation of formats, and legal issues.

Customer Needs and Information-Seeking Behaviors

A major barrier to resource sharing is lack of information about the clients and their needs. Depending on the definitions, estimates suggest that 10 to 20 percent of the general population have print disabilities (AFB, 2005a; Rubin, 2001). Library users who are print disabled are as diverse as the population (Canadian Library Association Working Group, 2005). Access to services is affected when funding agencies use inconsistent and contradictory definitions of who is eligible. People with learning disabilities, in particular, are often excluded from services or subjected to a lower priority of service (Black, 2004). A collective understanding and acceptance of common definitions will assist the process of resource sharing.

A "one-size-fits-all" service approach serves no one particularly well (Creaser, Davies, & Wisdom, 2002; Council on Access, 2000). Some public librarians focus on the elderly population, who read popular books, newspapers, and magazines translated into an alternate format such as audiotape (Evans, 2000). Some educational producers of alternate formats concentrate on textbooks, not aware of the need for access to a much broader spectrum of resources (NEADS, 2004). Higher education students with print disabilities need the same resources as their peers in the same courses (NEADS, 2004). The subject matter ranges across the spectrum of all postsecondary vocational, undergraduate, graduate, and professional courses. These students need access to textbooks, research reports, workbooks, online databases, periodical indexes, course packs, reference material, and audio-visual resources (Epp, 2005). They also need training in information literacy.

Some people access their resources through their public libraries by walking in, browsing, and selecting their own resources, perhaps with the assistance of a reader's advisor (Corrigan, 2003). Others require products to be delivered to their homes, assistive living centers, or extended care homes (Ryder, 2004). Those people with computers, technological skills, and adaptive technology want their books delivered directly to them electronically over the Internet. Some academic clients do their own searching in catalogs; others ask librarians for assistance (Saumure & Given, 2004). To meet the diverse needs, libraries need to move beyond their own boundaries to maximize the expertise and services of each and learn from each other.

Social and Professional Attitudes

"The single most important aspect of creating an accessible environment is staff attitude" (Wade, 2003, p. 311). "Our professional forefathers institutionalized social exclusion" by creating charity organizations such as the National Library for the Blind, beginning a long period of separation and neglect of blind readers (Owen, 2004, p. 58). In the UK, librarians say they struggle "alone to cope with a sometimes hostile institutional environment

where equality of access for disabled users was seen by management as a nuisance or even a waste of time" (Chapman, McFarlane, & Macwilliam, 2004, p. 40). "Students with learning disabilities are the largest group of students with disabilities on most college campuses . . . little research has been done to determine the nature and extent of barriers . . . to information. The presence of assistive technology in and of itself does not guarantee that these students will have access to information technology" (Wimberley, Reed, & Morris, 2004, para. 1). Many students in higher education do not know what is available to them through their academic libraries. This lack of awareness becomes an enormous barrier to making the information world, whether digital, print-based, or multimedia, accessible to print-disabled persons (Hicken, 2002). Conversely, there is a growing awareness by service providers and consumers that the expectation by some higher education institutions for students to "self-publish" alternate formats may not be the most productive use of the student's time (NEADS, 2004). Education about the needs of people with print disabilities, for library institutions themselves and for the public, is an important area where collective action is needed.

The "Digital Divide"

The "digital divide" is still a reality for many people who need to access Web sites and do not have access to technology and training (Yu, 2002). Many people—even inadvertently—impede information access by not understanding visually impaired students' particular needs (Saumure & Given, 2004). Web-based library resources need to be made more accessible: "A library's digitization project may make thousands of documents easily available to library users even when hundreds of miles away, but if this digitization involves little more than the scanning of printed materials that are posted on the Web in graphical image formats, then the information contained in these documents is rendered inaccessible to someone who must use synthetic speech technology to read the document" (Noble, 2002, p. 400). As a consequence of inaccessible materials, users with print disabilities do not have access to the quality and quantity of resources that have already been produced by various agencies (Blaeser, Creedy, & Epp, 2004).

People with visual impairments are also often unable to participate in activities outside the home because they do not have access to way-finding information (Marston & Golledge, 2003). Physical access to libraries is only one of the issues relating to the "hidden demand," preventing people with print disabilities from accessing libraries (Ryder, 2004). "The real irony is that in this age when technology can potentially open up the world of information to people with print disabilities, they are being locked out through inaccessible Web design and cheap digitization of text (where text is simply an image rather than marked up text)." (Canadian Library Association, 2000, p. 2).

Proliferation of Alternate Formats

For the resources to be accessible, print materials need to be transcribed into an alternate format or produced in a form that is compatible with adaptive or assistive technology. Multimedia material needs to be provided in an alternate format so that all aspects of information become accessible. Descriptions of some of the formats are provided in the Appendix. The convergence of technology, diversity of alternate format products, and proliferation of new playback and storage devices are simultaneously expanding and decreasing access. No longer are braille, large print, and analog tapes the only possible formats. Increasingly, libraries are adding digital formats for people to read text and listen to audio books. As a consequence of the proliferation of formats and products, libraries are challenged to plan their services with all the formats in mind (Mates, 2004). As a corollary, consumers themselves need to learn to use a number of different formats (Bell, Ruda, & Peters, 2003).

Legal Issues

Many countries have laws governing equity of services for people who have disabilities. In the United Kingdom the Disability Discrimination Act of 1995 makes it "illegal to discriminate against disabled people by refusing to serve, by deliberately not providing a service that is normally offered to other people, by offering a lower standard of service, or by treating the disabled person less favorably" (Ryder, 2004, p. 6). The "elusive visually impaired audience" represents a major dilemma in identifying clients for marketing library services (Kirchner, 2002). Additionally, the Special Educational Need and Disability Act (SENDA) in the UK guarantees equal access to education and resources. In the United States the Americans with Disabilities Act of 1990 (ADA) banned disability discrimination by public or private entities. Sections 504 and 508 of the Rehabilitation Act of 1973 extended rights of reasonable accommodation. In Canada equal access is guaranteed in the Canadian Charter of Rights and Freedoms and in the "duty to accommodate" as an operational requirement in the federal and provincial human rights laws (Council on Access, 2000).

Unfortunately, such equity laws have not eliminated legal barriers to full access, especially where copyright law intervenes (McGreal, 2004). Despite progress in providing exceptions for people with perceptual disabilities, copyright laws represent a confusing mass of limitations that impedes access within a country and internationally. Copyright exceptions for people with print disabilities are often jurisdictional or narrowly defined within national boundaries. While the Chafee Amendment provided an exception for people with disabilities, the United States controls access by requiring the use of equipment and devices specially designed for people with disabilities, restricts production to authorized agencies, and limits the genres that may be transcribed without permission (Lingane & Fruchterman, 2003).

In this respect, Canadian copyright law is more helpful in that it defines exceptions in terms of the print disabled population, rather than formats, and allows people with print disabilities to make alternate formats for themselves or to have others make products for them. However, large print is excluded. In Great Britain the law applies only to visual or physical impairments, not learning disabilities.

Federal and state education laws in the United States have extended access to textbooks in their states. Unfortunately, the federal Individuals with Disabilities Education Act (IDEA) addresses only elementary and secondary schools, not higher education (AFB, 2005b). Many states also have education and braille laws with varying requirements. However, the presence of education laws has not guaranteed timely and equal access (Martinengo, 2005). As a consequence, production centers, such as the Alternate Text Production Center in Ventura College, California, have developed statewide services for the production and distribution of electronic text, braille, and tactile graphics. Because of the legal restrictions, producers of alternate formats outside the state cannot share existing products and often request publishers' electronic files all over again. Copyright laws need to be upgraded and harmonized internationally to permit libraries to produce and share alternate formats. The legal framework will need to be revamped through the World Intellectual Property Organization, so that any library may convert material from one format to another to make it accessible for persons with disabilities (ARL, 2005).

LIBRARY RESOURCE-SHARING ENVIRONMENTS

To bridge the gap, some libraries and other service providers have successfully collaborated and have moved beyond their traditional organizational isolation to form intersecting networks of complex relationships. There is also some evidence that schools, higher education institutions, and format-specific agencies that previously operated in isolation are beginning to discuss mechanisms for sharing and/or adherence to nationally and internationally accepted standards that will facilitate resource sharing. These organizations include educational institutions (public and private), public libraries, specialized national libraries, private foundation libraries, charitable institutions, format-specific organizations, and commercial sectors.

Networks

Library services for people with print disabilities can generally be divided into two categories: the focus on primarily popular titles to meet the reading wishes of many, and the "on demand" service for an individual. Successful library networks provide services that cover more than collection building, access, and delivery. They also provide the means and methods to produce and develop standards. They act as advocates for better legal support, cooperation with the publishing industry, and more enlightened

public policy to improve the delivery of products. They collaborate to expand service eligibility, provide access to adaptive equipment, and train staff and users.

Founded in 1931, the National Library Service for the Blind and Physically Handicapped (NLS) in the United States is the most comprehensive resource-sharing network for public library services. Its large central library networks with fifty-seven regional and seventy-nine subregional libraries, including state, public, and private libraries. In 2004 NLS circulated almost 24 million recorded and braille books and magazines to approximately 800,000 people throughout the United States and U.S. territories (NLS, 2005). Since its beginnings, NLS has cooperated with libraries and organizations for the blind outside the United States. NLS was also a founding member of the Library for the Blind Section of the International Federation of Library Associations and Institutions (Cylke, 2002), which encourages international cooperation, standards, and advocacy to improve worldwide access.

Texas was one of the first states to join the NLS Network (Elder, 2002). Promotion of the services is the key to its success. Readers range in age from 6 years to over 100 years of age and have a wide range of visual, physical, and learning disabilities. A key component of the service is home delivery, using Free Matter for the Blind or Handicapped. The Texas State Library and Archives Commission, NLS, and public libraries fund the services jointly.

In collaboration with the NLS, the Oregon State Library offers supportive library services to community, academic, and school libraries that cannot fulfill their mandates on their own (Avery, 2003). The library provides braille; talking books; playback machines; and descriptive videos and includes access to fiction; nonfiction; books in Spanish, Russian, and Japanese; braille; twin-vision; newspapers; magazines on tape; old time radio shows; and contemporary videos and music. The rich network of the NLS extends through interlibrary loan to authorized libraries outside the United States (NLS, 1990). However, further development is needed to expand the delivery of Web-braille and digital formats outside the United States (NLS, 2003).

In Canada the Canadian National Institute for the Blind (CNIB) offers a partnership with a variety of public, academic, and provincial libraries. The Visunet Canada Partners Program is a centralized voluntary program based on a subscription fee to the charity (CNIB, 2005). The program extends local library services to clients who have a learning disability and are unable to access CNIB directly. Clients have access to the online digital audio collection, mail delivery of audio titles, and online access to the most popular books available through NetLibrary. Access is provided to books, newspapers, magazines, and other published works via postal delivery, local library access, and digital delivery. The materials include audio books in analog and digital (Digital Accessible Information System—DAISY) formats, digital electronic texts, access to full-text databases, descriptive videos,

braille music and music instruction, newspapers, magazines, e-braille, and Web sites. Further development is needed to permit intermediaries, such as partner libraries, to also access the digital material for transcription into other alternate formats, such as braille. Direct access for intermediary libraries will also expand the library's capacity to troubleshoot access for their clients at the local service level. While this is a promising program, it is still voluntary, it is not yet nationally funded, and it is not yet fully developed.

The "Share the Vision" program in Great Britain is a growing "mixed library economy" of commercial and voluntary producers of a range of alternate format materials accessible to a range of visually impaired people (Corrigan, 2003). Resources are available in braille, moon, large print, giant print, audio, and electronic formats. Service delivery is provided from both the voluntary and public sector (Owen, 2004). Partners include diverse services such as the Royal National Institute for the Blind Talking Books Service, Calibre Cassette Library, and the National Library for the Blind and Talking Newspapers Association, along with public libraries (Creaser, Davies, & Wisdom, 2002). The concept of "Share the Vision" is "Any visually impaired person should be able to contact any library and information service of their choice and be able to request any item in whatever format they prefer, whether for leisure, educational or other purpose and feel confident that all reasonable and informed steps will be taken to ensure that it is located and retrieved, or possibly reproduced in the requested format and forwarded to them at their preferred location" (Owen, 2004, p. 59). Through the "Branching Out" program, the national library works with public libraries to deliver more services and to extend the training and materials to all library authorities in England.

In the educational field, a survey of American school agencies for students with print disabilities concluded that a centralized model of production and delivery in each state was the preferred mode, using Instructional Materials Centers or Instructional Resource Centers (Wall & Corn, 2002). The reports of California higher education centers for alternate format production indicate a growing trend toward cooperation and collaboration among postsecondary institutions that have operated in isolation for some time (Martinengo, 2005). In Canada the Canadian Association of Educational Resource Centres for Alternate Format Materials (CAER) formed a consortium of eleven centers of production and delivery, which include provincially mandated libraries, one private library, and two university libraries to deliver resources across Canada to students in the K-12 system and to students in higher educational institutions served by the provincial centers. CAER's main strength is its collaborative and collective approach to serving students with print disabilities in Canadian postsecondary institutions (CAER, 2005). The services include interlibrary loan services, production of alternate formats, reference and information services, partnerships with internal departments and outside agencies, research and development, ad-

vocacy and public policy development, and training and literacy. CAER has developed protocols for borrowing and lending resources within the consortium. This practice has ensured the optimization of existing resources, the efficient sharing of resources, and cost savings in production.

In response to SENDA in Great Britain, academic librarians in southern England established a grassroots, self-help group called CLAUD (Consortium of Librarians in Higher Education Networking to Improve Access for Users with Disabilities in South and South West England) (Harris & Oppenheim, 2003). Eighteen academic library members paid an annual subscription fee to belong. The model was replicated in Wales (with Claud Cymru), the North East, Yorkshire, the Midlands, and around London. The original network participants lobbied to make publishers' files more available. They formed the network to support information exchange and research as well as raising awareness within the profession. They advocated a national standard-setting body to encourage equality in the provision of resources. To spread costs, some librarians suggested that libraries should provide local hubs and borrow items when required. Although initially focused on physical accessibility, the librarians also took on the tasks of making library catalogs more accessible. Some of the libraries offered links to external national resources, such as the Royal National Institute for the Blind.

Partnerships

Partnerships between libraries and commercial providers of audio and e-books show great promise. Publishers of popular books are increasingly offering commercial audio formats for sale. These resources are migrating from cassettes to CD outputs and rapidly on to downloadable formats. Although much of the material is abridged, many public libraries purchase the commercial audiotapes of popular works, decreasing the gap in access. Audible.com, a major online supplier in the United States, offers over 34,000 popular books, newspapers, and television programs in spoken word available for downloading on the computer to CDs or AudibleReady computer-based mobile devices (Audible, Inc., 2005). Downloadable Audiobooks from NetLibrary and Recorded Books, a division of the Online Computer Library Center (OCLC), delivers popular audio books to libraries through the Web (OCLC, 2005). Small and large libraries are using the service with a high level of download traffic. The NetLibrary of electronic texts is also available on subscription to libraries worldwide (OCLC, 2005). The aggregators of these commercial services are working with libraries to provide extended services to clients with disabilities. The commercial development of content frees libraries to concentrate on services and production of lower-volume titles rather than production of many of the popular titles.

Other sources of alternate format materials are electronic texts and online resources. Libraries in the United States and Canada purchase subscription services for electronic text and digital services for journal articles

and encyclopedias. Many of these resources are accessible through screen readers and other adaptive devices. Further collaboration between libraries and commercial suppliers is needed to remove the remaining barriers to make more e-books accessible through adaptive technology. In addition, libraries and commercial producers need to identify and implement the features such as downloadable text, book marking, searching, and other navigational features that will make the resources more usable. Libraries and commercial aggregators need to work collectively to produce a single source list of all of the available e-text and digital online services that may be accessible.

Individuals or libraries may also borrow educational resources through a service such as Recording for the Blind and Dyslexic (RFB&D) in New Jersey. RFB&D is a nonprofit organization producing audiobook books, electronic texts, and digital audio (DAISY) books (RFB&D, 2005). Individuals may subscribe through a membership fee, an annual fee, and a "per transaction" fee for delivery of specific titles. There are also institutional memberships within the United States. Since international loans are restricted to analog audio books, further discussions and agreements are needed to extend the loan of DAISY books from RFB&D outside the United States.

Union Catalogs

Union catalogs for alternate format materials have been a major cooperative success. In Canada the AMICUS Catalogue of the Library and Archives Canada, including the Canadian Union Catalogue of Alternate Format Materials, or CANUC:H, provides access to the location of existing resources (AMICUS, 2004). CNIB and most CAER members report their holdings to the AMICUS database and to CANWIP (Canadian Works in Progress.) In 2004 the Canadian Association of Educational Resource Centres for Alternate Format Materials and Library and Archives Canada jointly developed cataloging standards for tactile graphics to facilitate resource sharing (Katic & Lowenberg, 2004).

Since 1992 the alternate format holdings of interested CANUC:H contributors have also been sent to the union catalog of the National Library Service for the Blind and Physically Handicapped at the Library of Congress (Lowenberg, 1998). To qualify for participation in the union catalog, libraries and producers outside the United States agreed to allow international interlibrary loan or sale of their alternate format materials (Lowenberg, 1998). Ironically, reciprocal arrangements for digital formats are not available internationally from the United States.

Revealweb is an emerging national database of resources in the United Kingdom in accessible formats using the highest metadata standards (Revealweb, 2005). Supported and managed by RNIB and NLB, Revealweb is a multifunctional, Web-based, fully accessible database of over 100,000 titles from fifty-five organizations (Owen, 2004). It lists resources in braille,

braille music, moon, audio and digital talking books, large print, tactile maps and diagrams, electronic text files, audio described videos, and other formats. The Register of Suppliers also includes private producers who loan and/or sell their products. This database is a one-stop shop for determining whether an item has already been produced, thus fulfilling the requirements of UK copyright law for searching for the existence of alternate formats before beginning a new production (Revealweb, 2005).

In the United States the LOUIS database at American Printing House for the Blind, Inc. lists accessible books in braille, large print, sound recording, and computer files from agencies and publishers across North America (LOUIS Database, 2005). Hopefully more agencies, such as postsecondary institutions that produce alternate format materials, will report their holdings to the national databases to expand the accessibility of materials and reduce the information gap.

Standards

Standards are needed for alternate format production, universal design of information, and resource-sharing services. Alternate format producers want a single electronic file as a master to efficiently create a variety of formats, including e-text, braille, DAISY- and ISO-DAISY-compliant books, and other digital audio MP3 formats (Council on Access, 2003). Major alternate format producers for digital audio, e-text, and braille materials use production standards. Hopefully, more producers of alternate formats, especially in the academic field, will adopt the standards to produce materials that can be effectively shared.

Individuals, particularly in the educational community or those with adaptive technology, want individual access to publishers' electronic files. Currently, access to publishers' files is inconsistent at best. Some publishers are very willing to provide an electronic file to a producer or even directly to a student. Others take a long time to respond. Sometimes the file is provided in a publishing code that requires "deconstruction" and translation into a useable format. Electronic files in "image" PDF formats are not easily transcribed into alternate formats. The most commonly accepted file format for publishers' files is emerging as NIMAS (National Instructional Materials Accessibility Standard), a subset of the DTBook element set of the ANSI/NISO Z39.8 standard; it is used by American Printing House's Accessible Textbook Initiative and Collaboration (ATIC) project (ATIC, 2004). These standards are particularly important in the proposed establishment of publishers' clearinghouses in the United States, Canada, and the UK (Council on Access, 2003). Independent producers, particularly in isolated institutions of higher education, need to consider the minimum standards and also include the descriptions of illustrations, graphs, and charts. The standards will not only promote resource sharing but also provide a more useable product for students (NEADS, 2004).

The vision of the international DAISY Consortium of thirty-one countries is to develop the international standard and implementation strategies for production, exchange, and use of DTBs (digital talking books). The purpose is to maximize accessibility and utility of electronic books and multimedia. The goal is to encourage and foster the establishment of a global talking book library that transcends geographic boundaries and linguistic differences (DAISY Consortium, 2005). To achieve these goals, publishers' collaboration is critical (Kerscher & Sutton, 2004).

In the realm of resource sharing, the NLS has the most comprehensive set of service standards for its network members (ASCLA, 2005). On the other end of the scale are the Proposed Minimum Standards recommended by CAER for academic producers and libraries in higher education in Canada (CAER, 2003).

Postal Subsidies

The United States, UK, and Canada have postal exemptions from rates for material sent to and from blind persons. The material can be mailed free of charge by individuals, libraries, and other noncommercial organizations serving eligible persons. Printed books, magazines, musical scores, and other reading matter in raised characters, large print, or recorded form are included, along with materials for the production of alternate formats, equipment for writing, sound playback equipment, and mobility equipment. The services are available internationally to authorized institutions. The Canadian Library Book Rate is a subsidy that is also used for mailing books but cannot currently be used for "nonbook" formats (CLA & ASTED, 2004). While these subsidies provide economical delivery and access for people who are blind or visually impaired, the restrictions do not encourage equal access to those people who are learning disabled or physically handicapped. Rural and remote libraries, in particular, may not be able to afford to provide the interlibrary loan services to their clients for alternate formats without postal subsidies.

Access to Equipment

Transitioning to new digital formats is a challenge for any library system (Mates, 2004). While the NLS lends equipment free of charge to their constituents, the CNIB requires patrons to buy their own DAISY players. In public libraries not everyone has access to the new digital formats because they lack the equipment to play them on. According to a study of higher education students, access to equipment is problematic (Fichten et al., 2003). Equipment loan banks mandated by local governments are a great help for people who qualify, but some of the services preclude many students with learning disabilities from accessing the equipment. As a result, access to equipment for the diversity of formats—such as DAISY books, digital audio, downloadable text and audio, electronic braille, and electronic texts—is unequal (Mates, 2004).

One solution researched by the Mid-Illinois Talking Book Center, one of four subregional libraries of the Illinois State Library Talking Book and Braille service, in conjunction with the NLS and a number of midwestern states, involved creation of a self-service digital library where readers with computers can download their own content (Bell, Ruda, & Peters, 2003). With no additional funds, the eAudio Pilot Project introduced readers to audio books in digital formats with a variety of devices: PC, laptop, Tablet PC, PDA, MP3, or other devices such as Victor Vibe and Telex Scholar. Libraries can be effective venues for leveling the playing field to access by pooling their technological resources and sharing them in a collaborative manner.

Training

Research reports, surveys, and studies emphasize the importance of training for both consumers and librarians (Evans, 2000; Fichten et al., 2003; Hannah, 2003; Mates, 2004). Many librarians lack training in the use of the technology, tools, and sources of alternate formats and adaptive or assistive technology. Users need expert trainers with pedagogical backgrounds who not only utilize the technology but also know how to assess learning styles and how to teach and overcome barriers to effective use of the new technology. They need to be able to identify and locate materials that are available at their own libraries, online, or through interlibrary loan. They need to develop more accessible library Web sites, library catalogs, and online databases (Schmetzke, 2001).

As an example of cooperative training, the British Columbia College and Institute Library Services (CILS) in British Columbia, Canada, delivers regional workshops for academic librarians, disability service providers at higher education institutions, and public librarians in the province to learn about the information environment for people with disabilities (CILS, 2005). The participants learn about public policies regarding access to information, including copyright law. They discover emerging alternate formats and accessibility issues relating to library catalogs, online reference databases, and library literacy programs. In each session a blind user demonstrates the JAWS screen reader to access library catalogs and online databases. In the workshop, options for sharing resources are discussed. Participants identify the gaps in providing services to their clients and plan how they will work on solutions in their own institutions and elsewhere. An outcome of the workshops has been the development of tutorials and demonstrations of alternate formats. These resources are posted on the CILS Web site for other libraries to use (CILS, 2005).

Excellent resources for training are also offered by organizations such as EASI (Equal Access to Software and Information) at the Rochester Institute of Technology (Burgstahler, 2004), DO-IT (Disabilities, Opportunities, Internetworking, and Technology) at the University of Washington

(DO-IT, 2005), and SNOW (Special Needs Opportunity Windows) at the University of Toronto (SNOW, 2005). Many libraries have supported their staff in enrolling in these training opportunities to share experiences and expertise with each other.

RECOMMENDATIONS AND POTENTIAL SOLUTIONS

In Stan Skrzyszewski's vision of "smart communities," he recommends that the blind community partner with the visually impaired, learning disabled, and physically disabled community to initiate a successful smart community. He says that smart communities give away and share information and are cross-sectoral—that is, they are not restricted by functional, organizational, or jurisdictional borders (Skrzyszewski, 2000).

Effective resource sharing will require a concerted effort on many fronts. Several immediate steps are recommended. Librarians need to

- collaborate on research to determine user requirements;
- reach out and publicize their resources;
- implement logistical arrangements for borrowing and lending resources;
- update their international agreements for resource sharing on a technology-neutral basis;
- make training in alternate formats and adaptive technology a priority.

Producers of alternate formats need to

- standardize production formats;
- apply universal design principles to development of online resources (databases, library catalogs, Web sites);
- connect to libraries for resource sharing;
- contribute to national and international databases.

In the educational and human rights fields,

- educators and human rights specialists need to harmonize the definitions of print disability;
- students in higher education need to communicate their requirements in a timely and responsible manner so that resources can be provided equitably.

In the publishing industry, publishers need to

- deliver electronic files expeditiously;
- develop and adopt a standard file format.

In the political realm,

- public policy advocates need to harmonize copyright exceptions internationally;

- politicians need to support content production of alternate formats, including braille, at all levels.

Hopefully, access will expand beyond the transcription of books to extend access to all forms of information such as commercial and publicly produced audio, lectures, radio shows, accessible multimedia, and whatever new formats are developed. If these steps are taken in all sectors, the information requirements of all persons will be met by public, school, academic, and not-for-profit organizations; commercial enterprises; associations; and other types of libraries, community organizations, or clubs working in concert with each other for equal access for all (Abram, 2005).

CONCLUSION

The 95 percent gap is a challenge that no one institution or library can overcome on its own. It will take a community of librarians, advocacy groups, and consumers working with publishers and producers to build the national and international connections to equalize access for those who cannot use print due to a disability. They need to collaborate with other suppliers in all sectors, public and private, to optimize resource sharing for full access to a marginalized population.

APPENDIX: EXAMPLES OF ALTERNATE FORMATS

Regardless of how they are accessed, the range of alternate formats includes the following:

- Electronic text (word processing files) with screen voice readers, such as JAWS, to read print materials using a computer
- Electronic text (image files) for people with visual impairments that can use PDF documents to enlarge the print or manipulate the image on a computer screen
- Large print (print and digital)
- Digital audio, CD MP3 format, with human voice, with or without navigational features
- Digital audio, CD MP3 format, with synthesized voice, transcribed from electronic text, with file names
- Digital audio, CD MP3 format, with human voice and navigational features (DAISY format); this format includes the ability to find specific pages, chapters, sections, and, in some cases, indexes entries. DAISY formats vary from simple to complex mark-up features
- Tactile graphics produced through various means, including micro-capsule paper, thermoform paper, press braille, polymer and powder deposit methods, sculpture, and 3D models
- Braille in various formats including paper braille, electronic braille files, and refreshable braille devices

- VHS videotape or DVD of motion pictures with descriptive audible narrative or captioning for people with hearing impairments
- Accessible Web pages accessed with screen reading software that adds a synthesized voice to Web pages

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The Online Computer Library Center's Open WorldCat Program

CHIP NILGES

ABSTRACT

This article describes the Online Computer Library Center's (OCLC) Open WorldCat program. WorldCat is a worldwide union catalog created and maintained collectively by more than 9,000 member institutions. Open WorldCat seeks to make library collections and services visible and available through popular search engines such as Yahoo! and Google and other heavily used sites on the open Web. In this capacity, Open WorldCat provides an important central connection between the shared information of the library network and the Web. The article describes the history and rationale of the project; explains how Open WorldCat works for information seekers, participating libraries, and partners; and reports on what OCLC has learned from the program to date.

INTRODUCTION

Today's Web users expect information at their fingertips, regardless of where they are searching. Libraries can meet this expectation only by reaching further into the network of information resources that their patrons use and delivering content and services to users at the point of need. Satisfying patron expectations means reaching beyond the library portal and into the commercial search engines, vertical information portals, and e-commerce sites that have become such an integral part of patron workflow.

The Online Computer Library Center's (OCLC) Open WorldCat program is one approach to integrating access to library collections and services into the "flows" of Web users. WorldCat is a worldwide union catalog created and maintained collectively by more than 9,000 member institutions. With more than 60 million online records representing almost 1 billion

items held by member institutions, it is the largest and most comprehensive database of its kind. Open WorldCat seeks to make library collections and services visible and available through popular search engines such as Yahoo! and Google and other heavily used sites on the open Web. In this capacity, Open WorldCat provides an important central connection between the shared information of the library network and the Web.

Through Open WorldCat, OCLC partners with search engines and other Web sites to link from their search results to a "find in a library" service managed by OCLC and powered by the WorldCat database. The "find in a library" service provides the user with a list of nearby libraries with holdings in WorldCat. OCLC also manages a registry of Online Public Access Catalogue (OPAC) links for its member libraries, which are used to take the user to the record describing the item of interest in the OPAC of choice. A number of other services are available from the Open WorldCat interface, including such IP authenticated services as access to link resolvers, virtual reference services, e-books, and other digital licensed content. This article describes the Open WorldCat program, including the project history and rationale; how it works for users, libraries, and partners; results to date; lessons learned; and future plans.

PROJECT HISTORY

The genesis of Open WorldCat was OCLC's 2000 strategic plan, "Extending the OCLC Cooperative," which charted a course for the evolution of WorldCat into a "globally networked, and globally available information resource" (OCLC, 2000, p. 12). The plan, developed by OCLC leadership and staff in 1999 and vetted extensively by OCLC's board members, had as one of its key tenets the notion of "weaving libraries into the web" by making WorldCat openly accessible "in many versions from many paths: through individual library portals. . . . And through information partner portals (e.g., through database aggregators, Web search engines, and Web portals)" (OCLC, 2000, p. 12). The report elaborates on the concept of open access to WorldCat: "Information partners, including database aggregators, Web search engines, and Web portals, will use Extended WorldCat Discovery and Navigation services as an ingredient to build enriched access to information. With this cooperation, libraries will have a method to include library collections in the mix of Web pages and commercial content offered to library users" (OCLC, 2000, p. 28). This quote encapsulates two key drivers of the Open WorldCat project. The first was the notion of broadening access to library collections by integrating them into the open Web resources most heavily used by information seekers, regardless of the provider (library, .org, commercial site). The second is the notion of tackling this effort through a cooperative approach, in which WorldCat is used as a directory and brokering service, or a "switch," that alerts the Web searcher to the availability of library materials and then connects the user to those materials.

RESEARCH

Following the publication of the strategic plan, OCLC undertook research in three areas to vet the concept of Open WorldCat: (1) research with potential users of the service, to test the value proposition of finding library collections and their location on the open Web; (2) research with OCLC member libraries, to test the value proposition of exposing their collections through popular search engines as a way of extending their reach; and (3) research with potential partners, to test the value proposition of enhancing their services by integrating metadata describing library collections and a service for connecting their users to local library catalogs and portals for service. This research took place in 2001 and the first half of 2002.

Research with Students

A key component of our research with potential users of the service focused on college students. We focused on these users because we knew that students were increasingly using Web search engines and other Web sites as a starting point for research assignments. We wanted to assess the value that these users might place on searching collections of nearby libraries as part of their broader Web searching. We commissioned Harris Interactive to conduct an online survey of over 1,000 college students in the autumn of 2001 (OCLC, 2002). The survey concluded that students in this group were likely to start their research online—in fact, 96 percent reported they begin their research for assignments with Web search engines. At the same time, nine out of ten respondents claimed to use traditional print library resources at least some of the time, including print journals as well as books.

Respondents were also shown a mock up of an integrated search of library collections through a major search engine, with records describing items held by libraries and links to local library catalogs. Fifty-three percent reported that they would use such an option to search library collections through search engines at least on a monthly basis. Forty-seven percent said they would use the library locator feature to find a nearby library that has a book they want, and 45 percent said they would go to the library in person to get a book found this way. A significant number of respondents (37 percent) said they would travel to another library to get a book they found this way.

Other studies confirmed the importance of the Web as a research tool for students. Chief among these was a study commissioned by the Pew Internet and American Life Project (2002), "The Internet Goes to College." This study reported that the strong majority of college Internet users say the Internet "has had a positive impact on their college academic experience," and 73 percent of respondents reported that they use the Internet more than the library for research. These kinds of results supported our belief that students were indeed moving their research activity to the open Web and, in particular, to popular search engines. It also suggested that the library could offer these students value in this new research flow.

Research with Member Libraries

In the same period, we also undertook a variety of market research activities to assess the value of the Open WorldCat concept to the libraries that OCLC serves. Our belief was that Open WorldCat would help libraries by making them accessible on the open Web, which would help them to reach an audience that was clearly shifting its research activity to nonlibrary portals of various kinds. We also believed that there was particular value in an organization such as OCLC undertaking this project because it would be possible for OCLC to develop a shared infrastructure that many thousands of libraries could use to expose their collections in multiple open Web sites without any additional work on the part of the library. This research took place in 2001–2002 and included a survey of members, a series of four discussions with library directors and staff in different parts of the country, extensive discussions with advisory committees and OCLC Members Council interest groups, and briefings/discussions with the OCLC Board of Trustees.

The member survey took place in the winter of 2002 and included 194 libraries that use OCLC services. Fifty-eight percent of those surveyed agreed completely and 26 percent agreed somewhat to the following statement: "My library, its collections, and its services should be visible to any Web user regardless of where they reside." Those surveyed were also asked how likely it would be to enable links from search engines and Web book vendors to their collections through WorldCat. Forty-nine percent of respondents indicated that they were very or somewhat likely to enable links from search engines to their collections, and 36 percent said they were very or somewhat likely to enable links from Web book vendors. While the results did not indicate that a majority of member libraries would enable links, we considered this a good result, given that the concept had not been described in detail. Also, for each type of link, there was also a relatively high "neutral" result (28 percent for search engines and 21 percent for Web book vendors), suggesting that the strong majority were neutral or positive at this very early stage in the project. In short, OCLC members were supportive of the notion of broad access to their collections and, like their users, were beginning to think of search engines as appropriate access points to their collections. It was clear from these results that additional research was warranted.

One of the many face-to-face discussions with OCLC members took place with an ad hoc advisory group that met in Chicago on September 24–25, 2002. The group included leaders from academic and public libraries, statewide and regional library consortia, and the OCLC Board of Trustees. These experts were shown early prototypes of the system and were presented with a straw-man service model and business model for the service. They were asked what they felt the value of the service was to OCLC member libraries, what they believed the service must include on day one, who they believed to be the target audiences for the service, how

it should be positioned, who OCLC should partner with, and a variety of other questions along these lines.

The general recommendations of this group included a strong endorsement of the project. At the same time, the group was specific and clear that the service must meet a number of key objectives when released and that this project, if completed, would only mark the beginning of what OCLC needed to do to help its member libraries reach their users on the open Web. Some specific recommendations from this group included the following:

- Fulfillment services of some sort must be included in version one of the service—at minimum, the ability to find a nearby library with the item and link to the OPAC
- The service must be designed for end-users—students and public library patrons—and OCLC should continue research with end-users
- The service must include a critical mass of affiliates (including an “anchor” site such as Google)
- It must include all WorldCat bibliographic records and a critical associated mass of library holdings
- Informational materials to help libraries market the service and justify the service to decision makers (for example, city councils, provosts, etc.) must be included

Later in 2002 OCLC also conducted a series of four focus groups at the offices of four OCLC regional networks. These focus groups were attended by library directors and key library staff from OCLC member libraries served by these networks. The idea received support in these discussions, and participants offered important suggestions and articulated key concerns that had a direct impact on the development of the service.

Research with Partners

In addition to testing with potential end-users and the OCLC member libraries whose collections would be exposed in this new way, we of course needed to test the value proposition of the service with potential partners. That value proposition was, we felt, clear: that search engines and other kinds of sites on the open Web—such as book vendor sites—would see value in providing access, from within their sites, to a directory of the combined collections of thousands of libraries.

To test this proposition, in the late summer of 2001 we developed a prototype system that would accept simple queries (for example, ISBN, title/author) and return a Web page showing bibliographic information about the item, as well as a service that would allow the user to enter a postal code, state name, or country name and return a list of libraries near them that held the item they had found, based on holdings in WorldCat.

Between late summer of 2001 and June of 2002, we established partnerships with a number of Web-based book vendors, including Abebooks, Alibris, and AABA (Antiquarian Booksellers Association of America), to test the value of this approach to potential partners and to learn about the potential volume of traffic we would need to support, the technical model for delivering this kind of service, and the manner in which the service might be used. We chose these sites because there was a good fit between their catalog and WorldCat. We offered them access to WorldCat when a search against their catalogs failed to produce results, on the grounds that the book would likely be indexed in WorldCat. By starting with a restricted model of this sort, we felt we could learn what we needed to know to determine if there was in fact value in the approach—as indicated by real user activity—and to scale the system for broader use.

These early partnerships were successful on several dimensions. Partners valued the connection to WorldCat, usage activity was climbing (it reached more than 140,000 referrals per month by the spring of 2002), and OCLC member libraries and industry commentators had received the concept favorably. At the same time, acceptance of the idea of open Web access to WorldCat continued to grow. Additionally, other organizations had also begun to experiment with open access models for similar kinds of resources. Chief among these was the Research Libraries Group (RLG), which in October 2003 announced the RedLightGreen project, through which it made the RLG database available and searchable on the open Web.

Encouraged by what we had learned in our initial pilot, we contacted Google in May about the possibility of providing access to a set of WorldCat records that would contain pointers to a “find in a library” service residing in Dublin, Ohio. This service, the second generation of the pilot service described above, would perform essentially the same function: enable a user to enter location information and find nearby libraries that held an item in their collection. But it would be supported by a much more robust technical infrastructure and a more complete set of links to library OPACs. We proposed releasing to Google a set of records representing the 2 million most widely held items in WorldCat in order to maximize the possibility that a user finding one of them could also find a nearby library for service. We proposed to release to Google a subset of Machine-Readable Cataloguing (MARC) data fields for these records.

Google was enthusiastic about the project and signed an agreement with OCLC in summer of 2003 to pilot the service in its main index. This pilot began in December 2003, when WorldCat records first began appearing in Google.com. In January 2004 Yahoo! also became interested in the project and made the same set of 2 million records available from Yahoo.com.

At the time of writing, OCLC's partnerships with both Google and Yahoo! have been positive for OCLC member libraries, for users of Google

and Yahoo!, and for OCLC itself. Traffic on partner sites, including the book sites mentioned above (with the addition of Biblio.com), Google and Yahoo!, and www.BookPage.com, has grown to almost 9 million referrals a month (see Figure 1), significantly expanding access to the collections of OCLC member libraries.

In addition, links to Open WorldCat have expanded to 3.4 million records in Yahoo! and the Google main index (Google.com), and Open WorldCat has been featured in Google Scholar (www.scholar.google.com). (Google, in fact, has harvested the entire WorldCat database for use in Scholar.) In providing this expanded record set, we have sought to begin to address the issue of providing users of Open WorldCat with access to the complete list of library locations for items they find. This expanded record set represents the 3 million most widely held items from a version of WorldCat against which the OCLC Office of Research's Functional Requirements for Bibliographic Records (FRBR) algorithm has been applied. As a result of this process, these records represent the most widely held manifestations of the 3 million most widely held works in WorldCat. We have also begun to expand what is available to include 400,000 of the least widely held items in the database, that is, the items held by a single library.

Google Scholar is notable in that it has signaled a clear shift in the approach of major search engines toward a more refined and comprehensive approach to providing access to scholarly/research information. Yahoo!'s beta of its "Mindset" service, which allows the user to specify the intent of a search (commercial to informational), is a different approach that also serves the goal of providing access to a more information-rich search experience for students, researchers, and information professionals.

Because of the affiliate relationships that characterize Web search, the number of sites providing access to WorldCat content has grown substantially in the past year. Today, over 800 different Web sites link to the Open WorldCat "find in a library" service each month, and this number continues to grow. These sites include non-U.S. versions of partner sites, such as Yahoo! Mexico, Singapore, and Canada; sites that access content from Google, Yahoo!, or both (Alta Vista, Dogpile, etc.); and sites that have embedded links to particular Open WorldCat records.

HOW OPEN WORLDCAT WORKS

Open WorldCat includes service components for users, member libraries, and partners. These are described briefly below.

User Services

Access Points Users can access Open WorldCat through partner sites (<http://www.oclc.org/worldcat/open/partnersites/default.htm>) and follow links in these sites to OCLC member libraries for service. In addition, OCLC and its partners have published a number of Open WorldCat search

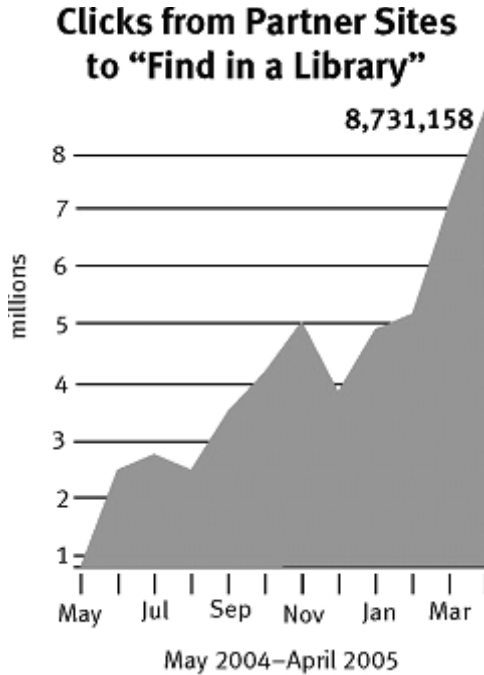


Figure 1. Monthly Accesses of Open WorldCat

tools that can be used to access Open WorldCat records directly from within partner sites. These tools, available from OCLC's Web site at <http://www.oclc.org/worldcat/open/searchtools/default.htm>, include a cobranded Yahoo! toolbar that includes a search capability limited to WorldCat records indexed by Yahoo!, a link to WorldCat records from within the Google toolbar using Google's "auto-link" capability, and Firefox extensions that allow a user of that Web browser to search the WorldCat records in Google or Yahoo! directly. Additionally, in summer 2005 we will publish a series of lightweight search tools and Web services to make it easy for libraries and other partners to embed searches to Open WorldCat within their local services.

User Experience The Open WorldCat user experience today is consistent with the pilot system, though it has been enhanced steadily to improve access to more of WorldCat and to more library services. A sample search will show the user's current workflow and also provide a baseline for describing known issues and how the program works for participating libraries, as well as plans for enhancing the service.

In the example in Figure 2, the user has entered the keyword search "Shelby Foote writer's life" on the main search page in Google. A keyword search on "Shelby Foote" would have retrieved the same item as approxi-

The screenshot shows a Google search interface with the search term "shelby foote writer's life" entered in the search box. The results are displayed in a list format, with the first result being "Find in a Library: Shelby Foote: a writer's life | English Book ...". Below this, there are several other results, including "Shelby Foote: a writer's life. By: C Stuart Chapman. Type: English : Book : Non-fiction. Publisher: University Press of Mississippi, ©2003. ...". The search results are sorted by relevance, and the first result is highlighted. The search bar includes a "Search" button and a "More" link. The search results are displayed in a list format, with the first result being "Find in a Library: Shelby Foote: a writer's life | English Book ...".

Web Images Groups News Froogle Local Desktop more »
 shelby foote writer's life Search Advanced Search Preferences

Results 1 - 100 of about 11,200 for shelby foote writer's life. (0.09 seconds)

Web

Find in a Library: **Shelby Foote: a writer's life** | English Book ...
Shelby Foote: a writer's life. By: C Stuart Chapman. Type: English : Book : Non-fiction. Publisher: University Press of Mississippi, ©2003. ...
www.worldcatlibraries.org/wcpa/ow/268ee631a71a4b68a19afeb4da09e526.html - [Similar pages](#)

Shelby Foote
 ... **Shelby Foote. A Writer's Life ...** For a biographer **Shelby Foote** is a famously reluctant subject. In writing this biography, however, C. Stuart Chapman ...
www.upress.state.ms.us/catalog/spring2003/shelby_foote.html - 8k - [Cached](#) - [Similar pages](#)

News of Note - Witnessing
 ... **to life** around us, to events both historical and personal, is a **writer's ...** among literary lions Hodding Carter III, **Shelby Foote**, and Walker Percy. ...
www.upress.state.ms.us/news/witnessing.html - 9k - [Cached](#) - [Similar pages](#)

MWP: Shelby Foote (1916-)
 Information about writer **Shelby Foote**, including a biographical and critical article, ...
 ... **Shelby Foote: A Writer's Life.** Jackson: UP of Mississippi, 2003. ...
www.olemiss.edu/depts/english/ms-writers/dir/foote_shelby/ - 79k - May 25, 2005 - [Cached](#) - [Similar pages](#)

MWP: Mississippi Books & Writers for March 2003
 ... **Shelby Foote: A Writer's Life** **Shelby Foote: A Writer's Life.** By C. Stuart Chapman. University Press of Mississippi (Hardcover, \$30.00, ISBN: 1578063590) ...
www.olemiss.edu/about/books/2003/march.html - 67k - May 24, 2005 - [Cached](#) - [Similar pages](#)

Figure 2. Results of a Google Keyword Search

mately the twenty-fifth result on the page, and a title phrase search of "A writer's life" would have brought up the same result as approximately the twentieth result on the page. (I will have more to say regarding page ranking and user search characteristics below.)

Every Open WorldCat record available through the Google and Yahoo! index is prefaced with the phrase "Find in a Library," as part of OCLC's effort to build the library brand within general Web search tools. The metadata in the "snippet" in Figure 2 is culled from the MARC record fields that we provide search partners. These include basic bibliographic information about the item, as well as subject headings (which can improve the hit rate). We are also beginning to experiment with other fields that may improve the performance of WorldCat data in these services. Users coming to Open WorldCat from a book vendor site, such as Alibris, or from a site that links to Open WorldCat from citations that it creates (such as Google Scholar or Bookpage.com) will not see a snippet formatted like the one in this example. Those users will see a link such as Scholar's "Library Search" or "Find in a WorldCat Library." From the "snippet" in a results set, the user will link to the "Find in a Library" page shown in Figure 3. (Here again, featuring the library brand is intentional.)

In addition to the ability to "Find Libraries with Item," this page leverages the metadata in WorldCat records by providing hot links on author name, title, and WorldCat subject headings. These links will execute a search for WorldCat records on the highlighted term against the search engine the user has come from. From the Shelby Foote record, for instance, clicking on the subject link "Southern States—Historiography" produces a list of seventy-eight titles from Open WorldCat that have been indexed in Google. These subject links are heavily used, which is not surprising, given that most users find Open WorldCat records in search engines as a result of a subject search rather than a known-item search.

Many WorldCat records also contain an "Other Editions" link, which a user can follow to a list of all of the versions (in Functional Requirements for Bibliographic Records [FRBR] terms, manifestations) of the work they have found. From the Open WorldCat record describing *The Da Vinci Code*, for instance, a user has direct access to all of the manifestations of this work via the "other editions" link (see Figure 4). Following this link retrieves a list of manifestations, including the large print edition, various sound recordings, translations, the movie, etc. (see Figure 5). In the summer of 2005 we will fully integrate access to manifestations into the primary "Find in a Library" page by consolidating all holdings and subject headings and representing all manifestation types on this top-level page. This use of FRBR, as well as the subject linking shown above, are examples of the value of a structured approach to metadata.

From the "Find in a Library" landing page, users have a number of options. They can enter a zip or postal code, state name, or the name of a country, and

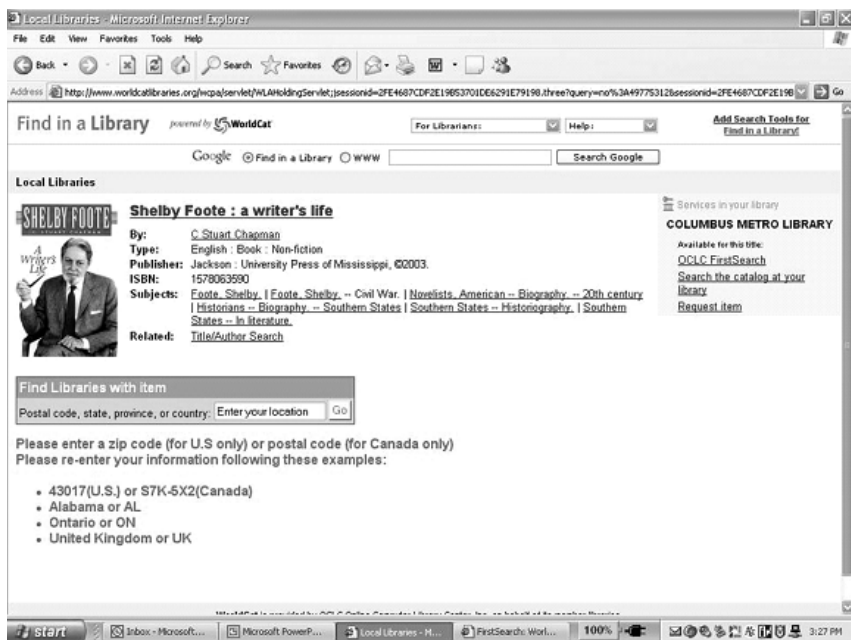


Figure 3. "Find in a Library" Page

the service will find a list of nearby libraries using a geo-location algorithm that retrieves up to ten nearby libraries or, failing that, broadens the search to regional and, ultimately, international libraries. In the example in Figure 6 the user has entered the Chicago zip code "60609" and retrieved ten local libraries holding the book. These libraries are sorted in descending order by proximity to the zip code entered, as indicated in the "distance" column.

The names of the libraries in the list are highlighted, indicating that the user can click on a name and follow a link to the library's catalog. In this example a user who clicks on the link to the Chicago Public Library, for instance, would be taken to the entry for this book in that library's OPAC, as shown in Figure 7. (Note the branding of Chicago Public Library on the Open WorldCat frame at the top of the page.)

As of this writing we have assembled a directory of 6,700 links to library catalogs, and approximately 65 percent of these will take the user directly to the page in the library's OPAC corresponding to the item found via Open WorldCat, using an ISBN, ISSN, or an OCLC number. We are actively harvesting and maintaining OPAC links, as well as links to OpenURL resolvers, library information pages, and library "Ask a" services. This "registry" component of Open WorldCat is a lynchpin of the service and an area that we will continue to invest in.

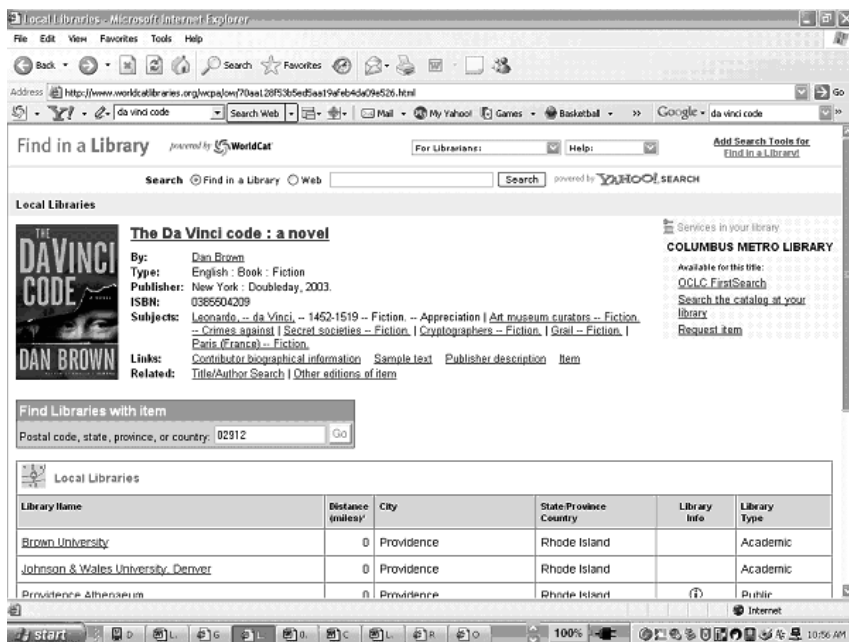


Figure 4. "Other Editions" Link

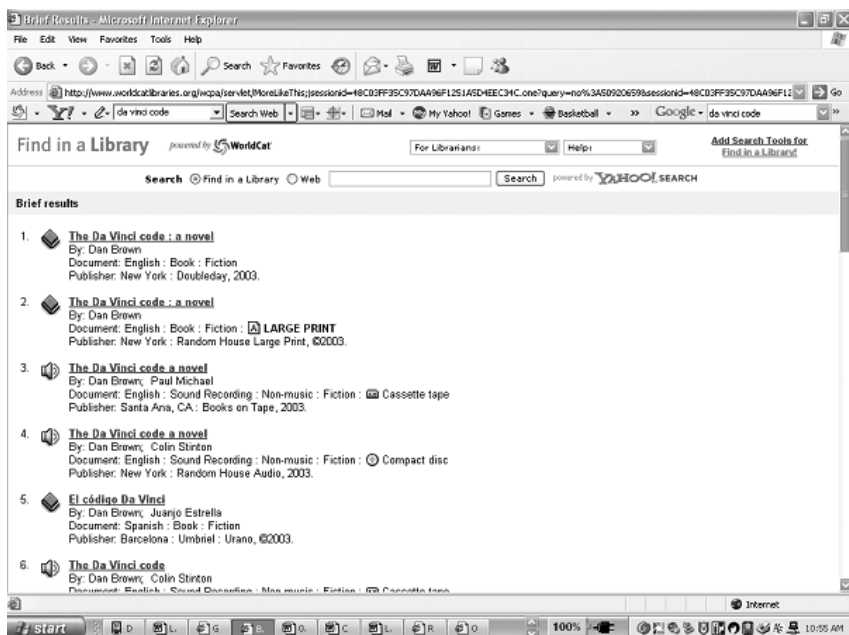


Figure 5. "Other Editions" Results Set

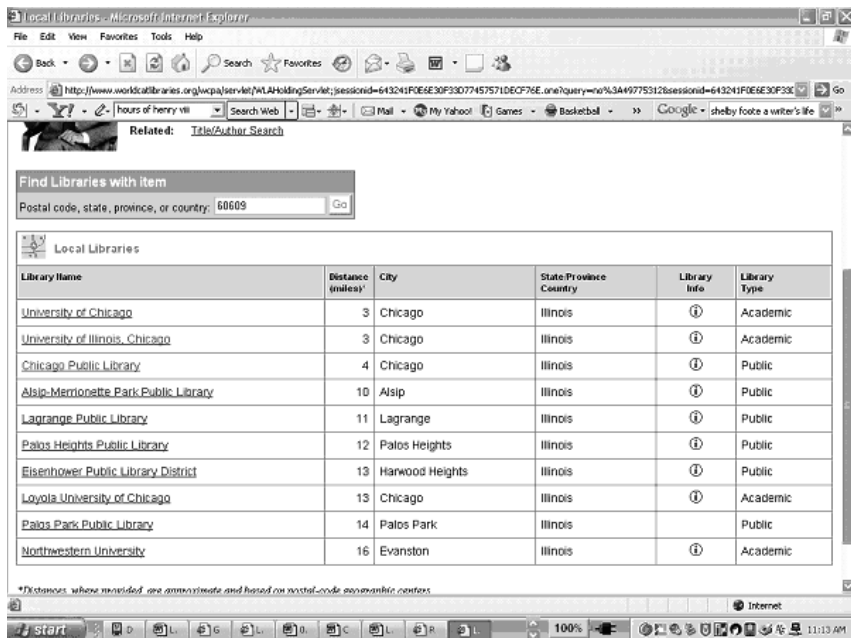


Figure 6. List of Libraries That Hold the Item

Users of the service who are coming from an IP address that OCLC recognizes are also able to access services that the library has registered with OCLC. In Figure 7, these links appear in the gray box on the left. Today, these include OpenURL resolvers, links to patron-initiated interlibrary loan (ILL), and links to other reference services (provided by OCLC and a variety of vendors). Approximately 15 percent of all links to "Find in a Library" interface come from users whose IP address is recognized by OCLC.

User Behavior We track a variety of user activity measures, which provide some insight into user behavior and guide enhancements to the service. In addition, we capture and analyze qualitative feedback through a comments link on the "Find in a Library" page.

Users most often access Open WorldCat via a simple keyword search (generally a subject search) of two to four terms. A recent one-day sample of searches that linked to Open WorldCat records included sixteen subject searches and four known-item searches in the top twenty searches for the day (see Table 1 for details). A 6,000-search sample of searches showed that the average number of search terms was 2.38, and the Open WorldCat record was, on average, approximately the sixth item displayed in the Yahoo! search results. At the same time, there is also significant linking activity from results found below item ten on an average results set, suggesting that Open WorldCat does serve a constituency of more determined researchers who

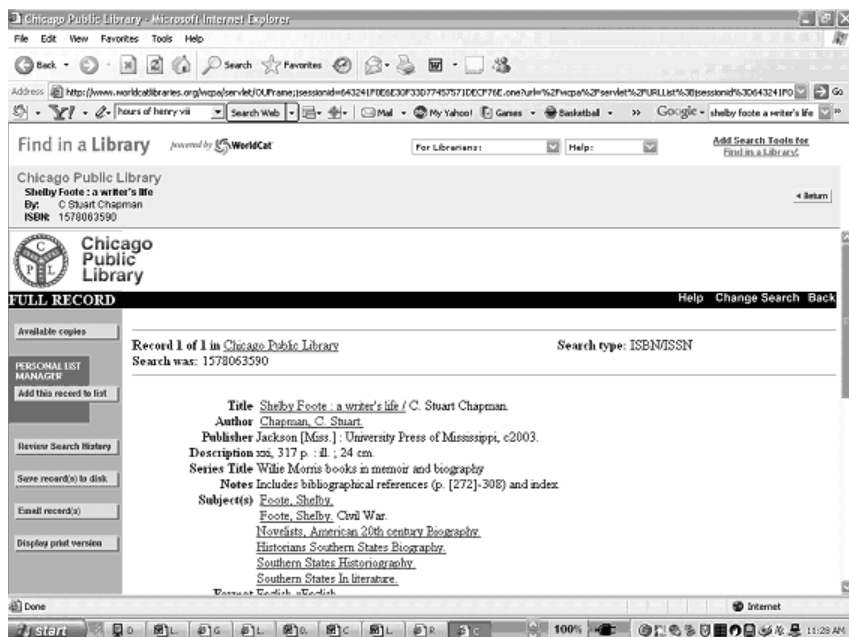


Figure 7. Link to Library OPAC

tend to dig deeper into results sets. We do not know how frequently users who see “find in a library” links on a partner site choose those links and click through to the “Find in a Library” service.

Users click on another link 15–20 percent of the time after landing on a “Find in a Library” page. Most often, they follow a subject link to another list of items. They click off to a library service of some sort (an OPAC, for instance) approximately 4–6 percent of the time after landing on a “Find in a Library” page. When they click to a library service, they go to an OPAC or library information page approximately 80 percent of the time.

Some users come to the “Find in a Library” page from an IP address that OCLC recognizes as valid for service. These users can choose from a number of services, ranging from direct links to full text, to OpenURL resolvers, to patron ILL or access to an e-book, depending on what their library has enabled. In April of 2005 users followed IP authenticated links approximately 22,000 times. Thirty-seven percent went to the library OPAC, 36 percent to FirstSearch, and 24 percent to an OpenURL resolver; less than 1 percent (approximately 500) were ILL requests. Because these links are enabled by libraries and displayed only from authenticated IP addresses, it is very difficult to generalize about user preferences or traffic patterns from these numbers. It is clear, however, that users exercise the options presented.

Table 1. Top Twenty Searches Leading to Open WorldCat Records

Rank	Search Term	Hits on May 20, 2005
1	Denmark history	38
2	0028 9604 (<i>Newsweek</i>) and WorldCat	36
3	Violence in the Workplace Prevention site (worldcatlibraries.org)	27
4	Teaching high school English	24
5	Find in a Library <i>Da Vinci Code</i>	24
6	0226103897 (<i>Chicago Manual of Style</i>) and WorldCat	22
7	Fuel injection	20
8	Medical	17
9	WorldCat	15
10	Lsyvygotskii site (worldcatlibraries.org)	14
11	Slideboard	13
12	Henry Frederick Prince of Wales site (worldcatlibraries.org)	13
13	9960340112 ("A brief illustrated guide to understanding Islam") and WorldCat	12
14	worldcatlibraries.org	12
15	Site www.worldcatlibraries.org-foxz1	12
16	Levente szasz site (worldcatlibraries.org)	11
17	Hannah Arendt	11
18	Greeting card thesis	11
19	Wendyl Marshall William Beaudine: From Silents to Television	10
20	Cooperative Learning	9

In addition to measuring system activity, we have also evaluated qualitative feedback. Figure 8 summarizes a sample of 192 comments submitted by users of Open WorldCat in the late autumn of 2004. The comments were analyzed by staff in OCLC's corporate marketing area and grouped into the categories shown.

A few of these areas reflect the relative newness of the service and relate to users and library staff praising the service and/or raising questions regarding their collections appearing or failing to appear in a search engine. Encouragingly, we received a relatively high percentage of testimonials from happy end-users who had discovered the service. "Find libraries with item issue" and "Library holdings issue," for instance, together comprised over 20 percent of comments. Most of these were library staff who did not know that only a subset of WorldCat records had been indexed by Google and Yahoo! or were asking questions about whether or not holdings had been set for their collection on a particular item. These kinds of questions, while important, were not surprising at that point in the project.

Other kinds of comments pointed the project in new directions. The largest category of questions, Reference, consisted of users who submitted what constituted a reference question through the comments box. As a direct result of this phenomenon, we have begun routing reference questions we receive to OCLC's 24/7 reference service and will integrate access to library "Ask a" and virtual reference into Open WorldCat in the summer of 2005.

Equally illuminating were comments regarding bibliographic issues with records and buying the items found through Open WorldCat. In response to the former, we are partnering with the OCLC Office of Research this

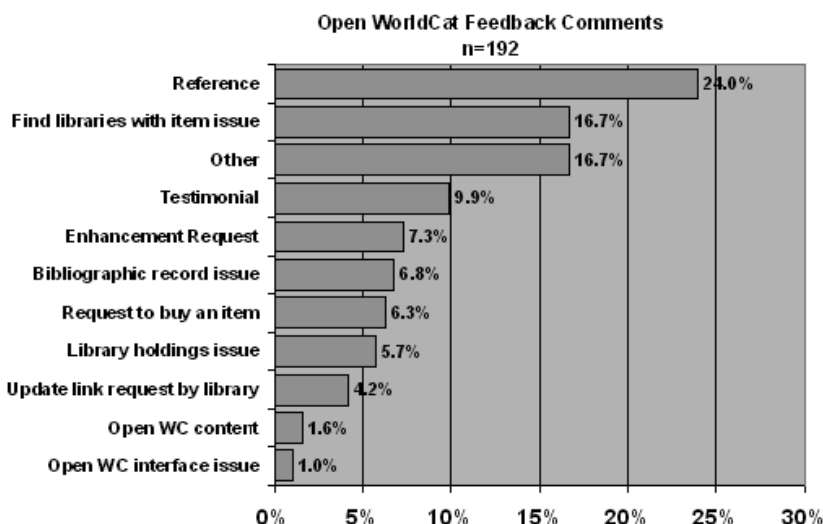


Figure 8. Open WorldCat Feedback Comments

summer to pilot a “meta-wiki” service through Open WorldCat that will give users the ability to contribute reviews, tables of contents, and notes regarding Open WorldCat records. In response to the latter, we plan to pilot a “buy it” link from Open WorldCat to determine the demand among users of Open WorldCat for purchasing the items they find in the service. The “buy it” option is also a way to test alternative funding models for WorldCat: proceeds from sales will be shared with OCLC member libraries directly.

Library Services

Libraries participate in Open WorldCat by setting their holdings in WorldCat and configuring their Open WorldCat profile. Libraries set holdings by cataloging with OCLC or by batch loading holdings directly into WorldCat. WorldCat includes holdings for approximately 12,000 institutions.

Configuration options for Open WorldCat include links to local services (OPAC, OpenURL resolver, “Ask a” service) and display preferences (for example, name of library to display in Open WorldCat). Libraries can also enable authenticated links and set the IP address ranges from which these links should display in Open WorldCat.

Configuration options for Open WorldCat are available from <http://www.oclc.org/worldcat/open/default.htm>. From this page, libraries with holdings in Open WorldCat also have the option to opt out of the service and have their holdings indicators removed from the “Find in a Library” service. To date, only approximately 150 libraries have exercised this option.

Beginning in January 2005, we also began providing libraries with usage statistics for Open WorldCat that indicate the number of links from each

partner site to their local site for service. This service, as well as the promotional materials we have developed, are intended to help member libraries promote Open WorldCat to their patrons and funding bodies and to show one way that they are seeking to meet their users at the point of need.

Partner Services

Open WorldCat also includes a variety of partner services. As mentioned above, the program includes a linking program through which OCLC provides partners with partial WorldCat records, as well as a program through which OCLC will accept known-item queries sent by partners to the "Find in a Library" service. Among current partners, two obtain metadata from OCLC (Google and Yahoo!); the rest are sending queries using a predefined syntax from metadata in their catalogs. OCLC also manages a version of Open WorldCat, called the WorldCat Partner Program, for sites that license content to libraries (<http://www.oclc.org/vendors/worldcatpartners/default.htm>). Through this program, partners can link into WorldCat and FirstSearch in a variety of ways.

A large component of partner services are OCLC's partner development and partner relations activities. As partner services evolve and change, so must Open WorldCat. Developing new methods of access (for example, Web services), maintaining and managing contacts within partner sites, working with partners to deploy Open WorldCat within new partner services, and managing data feeds and placement in partner sites are significant, ongoing activities that OCLC performs on behalf of its member libraries.

CONCLUSIONS

It is important to note that Open WorldCat is just one facet of a broader effort to provide open access to WorldCat. In addition to this program, OCLC offers its members a union catalog service, called the WorldCat group catalog, that provides library consortia with a publicly accessible catalog of their consortia holdings that is a customized view of WorldCat. There are currently more than fifteen group catalogs available on the Web (<http://www.oclc.org/groupservices/access/default.htm>). The OCLC Office of Research has also made a variety of views of WorldCat publicly accessible, including a fiction view and a "top 1000" view (<http://www.oclc.org/research/researchworks/default.htm>).

Open WorldCat is only a starting point for this broader effort. Over the coming year we expect the model to evolve dramatically, both by design and in response to the rapidly changing information environment. In addition to those already mentioned, our planned enhancements include an OpenURL registry and gateway that will enable us to redirect Web surfers to appropriate OpenURL resolvers. We also are actively pursuing new partners and plan to announce recent signings in the coming weeks and months. We continue to be interested in bringing more of WorldCat out into the

open, in particular the millions of uniquely held items it describes. And we are always looking to expand and improve the interface, the fulfillment options we can support, and the quality of the user experience. Finally, we are looking hard at simplifying and streamlining our services for enabling partners, whether members, other .orgs, or .coms, to integrate whatever components of WorldCat they wish to use into their applications.

We also expect to continue grappling with known issues. Page rank, for instance, is and continues to be one of the biggest challenges facing Open WorldCat and other services that seek to integrate content into user research flow/workflow in popular search engines. Specialized views, such as Google Scholar and Yahoo! Mindset, offer help for the specialized audiences that will likely use these tools, but more general audiences will need direct access.

Underlying this work is the understanding that the nature of search and, more broadly, the discovery-to-delivery chain for libraries and other information providers, is fundamentally shifting, and that WorldCat must shift with it. WorldCat must evolve from a monolithic reference database that is designed primarily for use in private networks by information professionals and researchers to a search service that combines vertical search, syndicated search, and Web services and is distributed across private and public networks. It is difficult to say today where this understanding will lead us, but it is easy to see that we must move, quickly, in the direction of broader and broader access options, and better and better methods for locating and getting the item, if we are to serve the needs of our members and their patrons.

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Perspectives on Building Consortia Between Libraries and Other Agencies

DIAN BOREK, BRIAN BELL, GAIL RICHARDSON, AND
WALTER LEWIS

ABSTRACT

This article looks at issues surrounding cooperative partnerships between different types of libraries, and between libraries and other organizations. The Ontario School Curriculum Resource (OSCR) and developments in Ontario and Canada are the focus of the article; however, it also provides perspectives on the cooperative experiences that are fundamental to many partnerships. The important benefits as well as the challenges of partnerships are considered, as is the future of cooperative resource sharing.

INTRODUCTION

It is no surprise that consortia are fast becoming a common approach to problem solving in order to seek joint solutions. Partnerships maximize funding opportunities and streamline information resources by linking technology and are often excellent vehicles for political lobbying. Costs of electronic journals and subscription databases continue to escalate, and the tangle of funding applications for small groups is a piecemeal solution at best. As fast as Internet subject lists are made, links go out of date. The "best source" is no longer static, as the mutability of information evolution makes nothing absolute or permanent. Partnerships improve productivity (shared workload) and expand funding opportunities. Public libraries, boards of education, municipalities, and postsecondary institutions are forming ad hoc and not so ad hoc alliances; joint projects, hence joint grant applications, promise bigger pieces of the funding "pie."

This discussion article looks at some of the issues surrounding cooperative partnerships. While most of the focus is on the Ontario and Canadian scene where the authors work, the perspectives on cooperative experi-

ence are fundamental to many partnerships. The contributors have been involved in a number of consortia and continue to seek new partnerships for cooperative projects; despite the hurdles, each continues to find that the benefits outweigh the challenges.

The project discussed at length in this article is one that all the contributors have worked on together: the Ontario School Curriculum Resource (OSCR). OSCR is the product of a School/Public Library Symposium held at the Mississauga Library System in December of 2002. The theme of this symposium was school and public library cooperation and resource sharing. A steering committee was formed to address the results: this group has been called simply the Library Cooperative (appropriately dubbed TLC.) TLC currently has fourteen partners from public libraries, elementary and secondary school boards, and college and university libraries.

BACKGROUND OF THE OSCR

In order to provide context for the discussions that follow, it is useful to clarify the conditions that led to the development of OSCR through the partnerships forged between several school boards, public libraries and postsecondary institutions in central and southwest Ontario.

In 1998 the Ontario Government released a new province-wide curriculum for all elementary school students; after the curriculum was implemented it was very quickly realized that a great deal of work was needed to identify necessary resources. In many cases teachers had been presented with this new curriculum only weeks before the school year commenced. Independently, educators, public librarians, parents, and students scrambled to find resources that were age appropriate and relevant for assignments.

After the 2002 symposium the TLC steering committee met; it was decided that the best course of action would be to build a provincial database to house "best source" material (that is, print items; image, sound, and video multimedia items; Web sites; and electronic sources from available onsite databases) for each major curriculum topic. It is an important point that the prototype database service would be built from the user on up. A student, teacher, parent, or librarian would be led to the resource pages through easy pull-down menus beginning with the questions "What grade are you in?" and "What subject are you working on?" and then select from common assignment lists to access resources.

The next requirement of the database was that, if OSCR was going to be relevant and practical, it needed to be housed provincially but be adaptable to the local needs of each school and library. The local library or school would have the capability to add or remove the resources displayed, and the interface would have local branding. Most importantly, OSCR would be able to jump into the local onsite library catalogs to verify availability and the location of materials. The local administration of OSCR needed to be intuitive—one should not need to be a rocket scientist to adapt the

local interface. Added features of OSCR included communication vehicles such as listservs and bulletin boards for professional information sharing, links to curriculum expectations on the ministry Web site, and also sections on how to do research, how to format bibliographies, how to format footnotes, etc.

Each of the TLC members had worked previously on a number of cross-cultural, cross-institutional partnerships to develop unified information access, so each brought a wealth of experience to the table that was as diverse as it was unique. Most notably, two of the committee members had been involved with two locally designed projects for the HALton Information NETwork (HALINET).

HALINET is a consortium of libraries in the Halton Region just west of Toronto. It is an alliance representing seven information providers within the Ontario Regional Municipality of Halton: Burlington Public Library, Halton District School Board, Halton Roman Catholic School Board, Halton Hills Public Library, Milton Public Library, Oakville Public Library, and Sheridan College. The HALINET portal is a shared information network that is accessible by residents in the Halton Hills Region of Ontario with their library cards. It is an integrated information network that also searches multiple databases and houses digital projects as well as resources through library Web pages (Bell & Lewis, 1998). Other members of the committee were and continue to be involved with Ontario Digital Libraries, the Ontario Library Association, and the Canadian Library Association and are active on various committee projects that all contributed to the vision that became OSCR.

During 2004 and 2005 OSCR's progression and development presented a number of challenges that are not unique to this project. Indeed, research indicates that all partnerships and consortia share similar hurdles. The rest of this article is a discussion of some of the challenges and solutions faced along the way. In true partnership style, this article is a product of each of our unique perspectives. The project coordinator provides the context, introduction, and conclusion. The academic librarian did the research and helped with the editing. The public librarian discusses funding challenges. Our technological expert speaks to technology challenges with multiple interfaces and diverse partner technical capabilities. An administrator addresses just some of the political issues that, while described from the Canadian perspective, are not uniquely Canadian.

FUNDING

OSCR's roots came from a number of localized projects housed within HALINET. The first was called "The Curriculum Database" or "The School Project Application" and involved only two of the current Library Cooperative partners. As OSCR evolved, it was found that, since this infrastructure was being used to develop OSCR, these two member organizations ended

up bearing the brunt of the financial costs of development. As OSCR expanded and the vision grew, this funding situation was not sustainable. It became necessary to solicit seed money to offset development costs. It was also necessary to have additional partners to participate in evaluation and testing. A membership contribution was necessary to further fund the project. This was set at a low figure of \$500, so that the pledged amount was manageable for the smaller institutions. The collected funds, along with the in-kind contribution of members, kept the project afloat, and development could proceed. The contribution of these funds became an invaluable asset in subsequent funding applications because it showed a financial commitment from a larger group of organizations. A critical decision was made not to be exclusionary in terms of who could attend meetings and participate. Nonpaying interested parties were encouraged to attend. A greater number of partners and participants gave the project a relevance and validity that resulted in positive improvement and growth.

Funding Applications

Partnerships involving different types of institutional partners present unique challenges when applying for grants. Funding agencies tend to support certain types of institutions or projects while excluding others. For example, public libraries in Ontario may apply for a Writers Union grant for author visits but schools cannot. Library Strategic Development Fund (LSDF) grants, from the Ontario Ministry of Culture, are available to public libraries but not to educational institutions. The question for TLC was how to craft our first funding application so that no partners were excluded while still addressing the requirements of the funding agency. It is important here to note that research and direct contact with funding agencies often revealed that the parameters for application were not as rigid as first thought. As long as the lead for the funding application fit into one of the eligible applicant categories, the LSDF grant was not exclusive; other parties could be included. The lesson learned was to do the research and ask questions. It proved valuable to consult funding agencies to find out whether published constraints were negotiable.

A prime objective for the TLC was to emphasize partnership goals without compromising the project or sacrificing the vision. The perspectives and issues of all partners had to be considered. At the same time, the group had to be careful not to complicate the project merely for the sake of funding requirements. The OSCR members are fortunate. The partnership is a natural one—libraries and education fit well together. By focusing on common goals, the differences in institutional cultures and administrative challenges were easily overcome.

Commitment from Diverse Partners

In a multitype consortium, inevitably there are differing areas of focus and priority. For OSCR, public librarians focused on matching local library

resources with diverse patrons (parents, students, and staff), both in person and online. School libraries were most concerned with resources for students. The focus was to empower students to do their own research and not to "spoon-feed" them. Academic libraries, on the other hand, needed to address growing numbers of graduating high school students they felt were ill-prepared for conducting research at the university level. The challenge was to meld different institutional expectations and cultural approaches to information access so that a single resource addressed all these concerns.

The key to OSCR's success is communication. Communication within the steering group grew as the prototype was developed. Communication channels were also built, reaching out to the greater communities that each of the partners represented. Presentations were made at conferences, and information sessions were offered to the stakeholders' institutions. Feedback was constantly sought, needs were expressed, and features and functionality were added to the project "wish list." The advice of the project programmer was constantly sought. Promotional literature was produced, and new partners were sought. The funds contributed by the partners kept OSCR going so that a mock-up for presentation could be completed. Each development step was integral for positioning OSCR to seek further funding and support. Research for this article revealed that the Library Cooperative, while innovative, is not unique. For an example of a similar project model see Alexander and Goodyear (2001).

Getting Commitment from the Authority Behind the Partner Representatives

Typical of many consortia, TLC members attending meetings were not the decision makers for their institutions. This often meant that members had to go back and convince their institutions' administrations of the value and relevance of the OSCR project. This also meant that it sometimes took longer to get the support for staffing and the financial commitment necessary to proceed. However, an advantage was that, in discussing necessary approaches, members were forced to examine and deal with the different characteristics of each institution. An unexpected benefit of these discussions was a better understanding of each other and the respective institutions. This bodes well for more cooperative and mutually beneficial projects in the future.

Demonstrating Potential for Success

For OSCR it was imperative to have a demonstrable product. The prototype application served several purposes: it was a practical demonstration tool to show what OSCR would do, it gave the partners something to work with to provide evaluation and feedback to the programmer, and it was concrete proof of the return on investment for the financial contributions. It also provided steering committee members with tangible progress for reports to home institutions.

TLC has found a workable model, and having supported the developmental stages through partner financial contributions, an LSDF grant has now ensured that OSCAR will soon be a fully working application. The last stage of the project will be to seek sustaining funding and a partner group able to keep the resources current and relevant.

TECHNOLOGICAL DIMENSIONS OF CONSORTIA PROJECTS

Technology for the TLC was a double-edged sword, for the same technology that made OSCAR's dynamic attributes possible also presented many cross-institutional challenges. Technological issues were a central aspect in the development of OSCAR. The goal of the project is to allow local teachers and librarians to provide links from location-specific recommended resources to their library's online catalog. But, in order for this to be possible, each institution's networks and computers had to be able to "talk" to each other. The software, platforms, intranets, and structure of networks within individual institutions offer unique challenges when one tries to build bridges to enable them to reach out to each other.

Fortunately, a couple of the OSCAR partners had addressed similar challenges before in several previous applications including Halton Images (HALINET n.d. b) (a consortium partner in Images Canada) and the Halton Newspaper Index (HALINET, n.d. a). These challenges proved that building bridges between different and varying hosts was possible and indeed ultimately well worth the effort.

Each new project also utilized improvements of the former. Each time this type of application is developed, new technology challenges us to make improvements, especially with respect to its usability by a wider range of people and institutions. A fundamental principle of HALINET is that the software is always open source so that users can benefit from shared improvements. But the application must also be basic enough to be delivered as an application service provider (ASP) application to partner institutions with little or no technological know-how or support in their own workplace. These previous experiences proved invaluable during OSCAR's development.

STANDARDS

The standard network tools that underlie the World Wide Web, email, content transfer using HTTP, and image formats like GIF and JPEG are increasingly taken for granted by most users, but they are critical in allowing resource sharing and cross-platform communication. These common Internet standards are the basis for projects like OSCAR. They can be used to bring disparate partners into a common, shared environment.

However, Internet standards continue to develop and change in a cycle of rapid development. Cascading Stylesheets (CSS) and Javascript in par-

ticular suffer from different implementations in different versions of user software. The development of the OSCR software had to take into account that different consortia partners would have different versions of software and different deployments of these changing technologies.

SEPARATING CONTENT AND PRESENTATION

A key to success in individual projects, as well as consortia projects, comes in the separation of content from presentation. The OSCR project is based on Model-View-Controller (MVC) principles and has an n-tier architecture. On a practical level this translates into the content being stored as an XML document or in a relational database that supports Standard Query Language (SQL). Between the end-user and that content are a set of business rules and templates, which transform content into something to be presented to the user's program.

The end-user's program has traditionally been thought of as a browser running on a personal computer, but this perspective needs to be broadened. End-users may run Web-enabled cell phones, PDAs, and assistive technologies of various types. And the request might be initiated by another program, such as a Web search engine's indexing bots, RSS aggregators, the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) harvesters, or similar programs that index materials for location on the Web or otherwise facilitate access.

Today many libraries and consortia are investing in federated searching technologies and Web services, which may use protocols as diverse as Simple Object Access Protocol (SOAP) and Z39.50. To support these technologies across a set of partners, it is particularly important to separate the content because the presentation may be in a wide array of styles. Even for the most common end-user connecting to the application server via a "traditional" personal computer and browser, the separation of content and presentation is essential.

It is also useful for combining local content and local presentation to fit local needs. In the various cooperative projects that members of TLC have been involved in, local branding has always been a key factor. Branding is the ability of local Web pages to display local frames and banners of the library and school boards along with shared display and content. For this, it is ideal to have those elements that select content (for example, scope of a search to a particular subset of records) and those that manage presentation (for example, headers, footers, stylesheets, etc.) both be stored dynamically in a central database rather than being hard-coded. The business rules (which we have written in a variety of programming languages) look at the requesting Uniform Resource Locator (URL) and determine which set of presentation rules are to be used to organize each location's content set. Even for common Web browsers this requires alternate rules for browser versions that use CSS or other services. The results are cooperatively

developed server-side tools that are “skinned” according to the member’s preferences. The same content can be delivered using another set of rules to another kind of Web-accessible device or to other Web services.

At the other end of the content management spectrum is the matter of data entry. One part of this is data upload, either of files or of structured content. This is fairly simple to manage with common online methods and technology. The second part of data entry is online entry by local staff at the partner institutions. An HTML interface has been provided for this.

Given that the people doing content management are typically using an up-to-date Web browser, it is possible to add some elements of client-side programming for data entry validation. A succession of additional server-side rules are in place to check content before it is placed in the data store, which may have a further set of rules to ensure data integrity. Depending on the risk to the organizations, various strategies for securing the login and encrypting the sessions also must be considered.

There are technological issues that are faced by many library and multi-library projects, not just TLC’s OSCR. A common consideration is the question of using internal or external developers for a project. As each project is unique, it brings with it a unique learning curve, and external contractors may be the only strategy that makes sense. Obviously, a clear agreement is needed about ownership and intellectual rights to the resulting computer programs. For projects built by using internal developers, we often find that there is much computer program code that can be reused or adapted from project to project. Internal development also makes it simpler for a library to share its applications and programming code with other libraries in an open source arrangement. An open source arrangement allows all institutional partners, and other libraries, to customize, develop, and enhance the software, so this is a particularly effective approach with library partnerships and consortia.

The application tools that are used on a particular project can also be open source or commercial software solutions. The challenge is often one of choosing a commercial package or paying commercial rates to have software developed, or of using open source software and locally developed software solutions, which are often ever-evolving and never seen as “finished.” An important objective of any online project, however structured, is to ensure that the members of the consortium can—hopefully at any time, and with limited cost—get all of the content, including all of the associated indexing, abstracting, and other metadata, out of the project when a better way to deliver it comes along.

POLITICS OF COLLABORATION

Despite varying needs and working environments, libraries of different types have often been able to form successful partnerships to develop and

deliver joint services such as OSCR. Libraries and their partners traditionally work together for “selfish” but positive reasons: to leverage shrinking budgets, to learn from each other, to build better tools together and, most importantly, to serve their common users better by taking advantage of one another’s collections.

TLC is an example of how local initiatives can grow to form the building blocks of state or provincial and national shared services. The partners in TLC have discovered that, when they all work toward a common goal of serving a common user group (students and their parents), libraries of different types can harness human resources, creativity, and the unique value of local collections.

In some cases there are roadblocks at the political and governance level that make consortial behavior even more vital. Ontario, unlike most jurisdictions, has no provincial library. To compensate, the grassroots library community in Ontario is working to bring into being a new virtual organization called the Ontario Digital Library (ODL). ODL is seen as a way of achieving at least some of the functions (joint licensing, coordinated service delivery, provision of electronic tool sets to expedite digitization efforts, and more) that are normally provided by a provincial library but without the legislated governance structure.

The roots of an ODL go back at least as far as *One Place to Look*, produced in 1990 (Ontario Public Library Strategic Planning Group, Ontario Library Association, & Ontario Ministry of Culture and Communications, 1990) and the more recent *Building Value Together* strategic planning documents from the public library community (Ontario Public Libraries Strategic Directions Council, 2002), both of which focus on the merits of collaboration among all types of libraries in an “Ontario Library” rather than an “Ontario Public Library” alone. *One Place to Look* gave every librarian a glimpse into the then-distant future:

Every Ontarian will have access to information resources within the province through an integrated system of partnerships among all types of information providers . . . No one library has the resources to meet the information challenges of any given community, but all communities hold resources that are unique and usable by others. It is necessary, therefore, to create a comprehensive and compatible set of databases that define the resources and capabilities to Ontarians wherever they may live in the province . . . The bibliographic strength necessary to meet today’s information needs comes from the cumulative value of the collections in Ontario’s public, school, college, university, and other libraries. (Ontario Public Library Strategic Planning Group, Ontario Library Association, & Ontario Ministry of Culture and Communications, 1990, p. 16)

In the early 1990s the Ontario Library Association Task Force on Public Library/School Library Cooperation worked “to improve communication and to foster ideas which would enhance the library service to your people

provided by the two library communities" (Ontario Library Association Task Force on Public Library/School Library Cooperation, 1995, p. 8). The task force studied a wide sampling of collaborative projects throughout Ontario. One example is a highly successful partnership between the public library and the school libraries in Peterborough to purchase and share a common library automation system. The task force found so many successful examples of cooperation that they asked themselves, "what if shared activity were the new economic paradigm?" (Ontario Library Association Task Force on Public Library/School Library Cooperation, 1995, p. 7). They were able to develop some conclusions about factors shared and demonstrated by all successful models that they studied:

- Presence of strong, sustained field leadership
- A history of cooperation and interorganizational understanding: the longer the history, the more agreeable the climate
- Jurisdictional manageability—complex geographic jurisdictions have less success than simple (symbiotic) relationships that have existed over long periods
- Committed personal, professional relationships among key persons who can make decisions to act jointly (Ontario Library Association Task Force on Public Library/School Library Cooperation, 1995, p. 9)

In Ontario today, according to the ODL Business Plan document, cooperation is very strong among libraries within the college and university sectors. Within each sector, libraries have worked together on a large number of projects that have resulted in a greater equality of resources and services being available to students across the province. The same level of cooperation has not been possible among public and school libraries, although the results of some current cooperative projects such as OSCR indicate that working together will have significant benefits for Ontarians. Even though libraries often serve overlapping constituencies, cooperation between the sectors has been hampered by different mandates and focus and different funding mechanisms (Ontario Library Association, 2003, p. 2).

The ODL steering committee recognizes that other provinces and numerous U.S. states have successfully met the information needs of their citizens by providing a coordinated approach to the purchase and delivery of digital information and services. Key to the success of these initiatives has been leadership from state and provincial governments working in partnership with the library, education, academic, health care, and business communities.

Some of the best examples of these include digital library programs in Georgia, Michigan, and Ohio. The Colorado Virtual Library and the Heritage Colorado Web service (Colorado Digitization Program, 2003; Colorado State Library, 2005) are typical of what can be achieved. They represent functioning multitype consortia including all types of libraries.

These services are standards based. They provide centralized search portals for end-users, as well as supplying organizations with training and tools to enhance their digitization abilities.

Summarizing an in-depth analysis of cooperative projects in the United States, William Potter wrote:

For most academic *libraries*, statewide cooperation offers distinct advantages and incentives. The state provides a predetermined political and geographical grouping of *libraries*. There are often common governing agencies for publicly supported institutions of higher education, perhaps a board of regents or a coordinating board for higher education. State government also exercises control over the publicly supported colleges and universities and, of course, provides much of the funding. The extent of direct interest that the governor or legislature takes in the operations of the *libraries* varies by state, but this interest is always a factor. The fact that a group of *libraries* shares a common funding source, be it directly through elected officials or through a board of regents or oversight agency, is an important reason to build statewide cooperative systems. There is great appeal in efforts to pool resources and in cooperating to control costs. (Potter, 1997, p. 416).

Leadership at national levels has never been needed more. An exemplary model for the past nine years is the American Memory project. "Beginning in 1996, the Library of Congress sponsored a three-year competition . . . to enable public, research, and academic libraries, museums, historical societies, and archival institutions . . . to digitize American history collections and make them available on the Library's American Memory site" (Library of Congress, n.d., para. 5). This service, under the guidance of the Library of Congress and with the help of private- and public-sector funding, has assisted a number of important collections to be digitized and found through collective finding aids.

In Canada, since 2004, a new institution has been in the making consisting of the former National Library and National Archives. The newly created Libraries and Archives Canada (LAC) is seeking to define a new and more proactive leadership role for itself. In June 2004 it issued a document, *Creating a New Kind of Knowledge Institution: Directions for Library and Archives Canada* (Library and Archives Canada, 2004b), which declares that the LAC will no longer be a passive repository and will instead focus on access, a capacity to interpret, and the provision of innovative services that will encourage Canadians to discover, learn, and share knowledge and culture. The new LAC has promised to bring together a wealth of networks and partnerships. LAC plans to work to connect Canadians with their documentary heritage through Canada's 3,600 public library service points, its 800 archives, its strong network of academic libraries, its school libraries, and other cultural institutions across the country. LAC recognizes that one of its challenges will be to understand its essential role as a

national institution and how best to play it. LAC has reaffirmed its belief that activities such as policy, preservation research, standards development, international collaborations, and the development of national strategies are among its roles. The Canadian library community is anticipating a national digitization strategy to be announced by LAC before the end of 2005. It is anticipated that locally developed tools such as OSCAR will play a vital role in a unified national approach to the provision of sophisticated public access to information through value-added portals such as OSCAR.

Working in parallel to Library and Archives Canada is the Canadian Initiative on Digital Libraries (CIDL). CIDL is a voluntary alliance of Canadian libraries and organizations, formed in the 1990s, that recognize the growing importance of digital information. CIDL now includes fifty-five members: large and small, academic and public libraries, as well as special libraries and like-minded organizations such as museums and archives. The CIDL mission is to promote, coordinate, and facilitate the development of Canadian digital collections and services in order to optimize national interoperability and long-term access to Canadian digital library resources.

Over the past eighteen months, CIDL has been formulating and promoting a national vision for collaboration dubbed "Digital Canada" (Library and Archives Canada, 2004a). The Digital Canada vision is a blueprint in which every type of library has a role. It will feature a set of integrated search portals, such as OSCAR, geared toward users of different ages and educational and cultural backgrounds. OSCAR, which started as a local initiative in Ontario, will be adapted to the curriculum requirements of each province to become a national educational resource.

Digital Canada will also build on the model of already successful national-level services such as Images Canada (Library and Archives Canada, 2002), a national portal for photographs developed by the LAC and inspired by Picture Australia (Picture Australia, 2005). CIDL will facilitate the creation of a series of similar meta-search engines that can be built on existing successful national projects such as Our Roots (Our Roots, 2003), Early Canadiana Online (Library and Archives Canada, 2005), and Virtual Museum Canada (Virtual Museum of Canada, 2005). Like Images Canada, a union catalog of metadata will provide users with links to separate databases of unlike types of data that are joined by common themes or document types.

Digital Canada will also provide shared, simple-to-use applications and tools for any partner that opts to use them as an alternative to building local digitization systems repeatedly from scratch. These Web-based tools, like OSCAR and the newspapers and images tools developed by HALINET, will be built to the highest standards and designed specifically for interoperability. These tools will be hosted on regionally located servers throughout the country.

This will eliminate the need for many libraries to have to invest in redundant network and server capacity and to acquire the skills necessary to

support them. The toolsets will enable even the smallest libraries and their partners to digitize and create metadata for their collections and contribute the content to the regional and national fabric. The CIDL concept is much like sewing a virtual "national quilt" to which every contributor brings a single standardized square. They will be provided with the tools of framework, the needle and thread, and be empowered to contribute the cloth of their own local content.

In conclusion, the OSCR project is typical of an evolving Canadian approach to a national digitization strategy. Local partners think globally, then develop locally, building tools that are scalable in nature and built with interoperability and standards in mind. The ODL and Digital Canada initiatives will combine the best of grassroots tools and content with provincial- and national-level portals and gateways to provide seamless access to the digital collections of libraries and their partners throughout the country and around the world.

SUMMARY

It is a testament to the tenacity and dedication of information professionals that we continue to strive for mutually beneficial projects with colleagues in other fields, in spite of institutional and political divides. Despite the hurdles, whether it is building technological bridges or drawing up creative funding applications, the driving force continues to be customer access to "best source" information in an easy-to-use environment. While this article examines issues, benefits, and hurdles to cooperation and partnerships, it would be remiss not to acknowledge the corollary—the scary reality if we do not build partnerships and pool resources. Simply put, if we let funding, technological challenges, or politics interfere with the goals of information access, and compromise our professionalism by letting the obstacles become insurmountable, are we then obstructing information access? Information is an essential building block of life and will help to determine the world in which we all live. Wouldn't we inadvertently be limiting our own future? In this light, what are a few petty hurdles along the way?

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Knowledge-Sharing Activities in India

N. LAXMAN RAO

ABSTRACT

Libraries in India are striving to provide necessary and relevant information to their users. Limited resources have been one main barrier to satisfying the growing informational needs of the users. Now, the Indian libraries are planning various methods of resource sharing to help meet information demands. Attitudes of library and institutional managements have undergone a change, to become more open to the benefits of resource sharing. A number of formal arrangements are being made for resource sharing among the libraries. A number of resource-sharing activities are discussed in this article, broadly arranged under four headings: National Information System in Science and Technology (NISSAT) National Information Centres (NIC); library consortia; document delivery services; and interlibrary cooperation.

INTRODUCTION

India is one of the largest countries in Asia, with a land area of 3,287,263 square kilometers. It has a land frontier of 15,200 kilometers and a coastline of 7,516.5 kilometers. Andaman and Nicobar Islands in the Bay of Bengal and Lakshadweep in the Arabian Sea are parts of India. Its population is 1,027,015,247 (2001 census) (*Manorama Year Book*, 2005). Today India is producing a very large number of skilled workers. It has an active satellite space program and is recognized as a nuclear power. India's recent achievements are possible at least in part due to information and knowledge dissemination. Therefore, India is striving to become a knowledge superpower.

The contribution of libraries to India's advancement is phenomenally important. Libraries in India have struggled with many problems, but recent government support for research has provided an opportunity for

the development of library services and increased access to information. Government encouragement of funding of private organizations through tax benefits has also led to investment in libraries and information as part of research activities. The need for Indian researchers and scientists to compete in the global context has led libraries to seek several alternatives for providing increased access to information. Resource sharing is one of the primary functions of the libraries, which has enabled them to provide increased access to information for their users.

Every library attempts to use all its resources to achieve its stated objectives, to provide the best possible services. It is usually not possible for any single library to procure all the materials that are relevant to its users. This has become especially true with the literature explosion in recent decades. Naturally, libraries try to borrow materials from one another informally, but informal borrowing is difficult to sustain without more formal agreements between libraries. In the context of ever-increasing demands for information and limited resources, it became necessary for all libraries to develop agreements for the sharing of materials and information. Resource sharing includes sharing of various types of resources, such as human, infrastructural, and information, but the main emphasis continues to be on sharing of materials.

Libraries in developing countries face particular problems procuring library materials and information resources. This is due to lower currency values in the international market and to limited financial resources, along with regular increases in subscription prices. Most libraries are supported by different levels of government either directly or through government-funded agencies. In India many libraries were procuring the same materials from the same sources and spending large amounts of funds. In turn, libraries were finding it difficult to procure alternate resources due to limited funds. Therefore, they were denying access to a full selection of information resources. There was increasing frustration among the information providers and seekers about limited access to existing and available information resources.

There were several studies on procurement and use of similar expensive resources, especially secondary resources, and duplication of high-priced resources by many libraries in India. There were repeated complaints that use was not optimum, and cost per use was estimated to be very high. When this crisis reached its peak, libraries, government agencies, and even the concerned ministries started working together to find ways to make better use of limited budgets to provide access to increased numbers of resources as well as make optimum use of the resources to enable the scientists and researchers to become more information rich.

Libraries in India have developed many schemes to make optimum use of library resources and to provide access to increased amounts of materials through resource sharing. Over a period of time several attempts have

been made. The overall success of these plans or attempts is difficult to evaluate. However, it is a fact that approaches have been varied in nature and experiences have been mixed. Some of the major initiatives taken by libraries and other agencies in India for resource sharing in libraries and information centers are discussed in this article.

Resource-sharing activities in Indian libraries can be grouped broadly into four categories:

1. Establishment of National Information System in Science and Technology (NISSAT) National Information Centres (NIC)
2. Library Consortia
3. Document Delivery Service (DD)
4. Interlibrary Cooperation

NISSAT AND SICs

The National Committee on Science and Technology of India (NCST) and the Council for Scientific and Industrial Research (CSIR), with support from the United Nations Educational, Scientific, and Cultural Organization (UNESCO), developed a national-level plan in 1977 known as NISSAT (National Information System in Science and Technology). It was established with the main objectives of organizing information support facilities for customers engaged in research and academics, promotion of existing information systems and services, introduction of modern information handling tools and techniques, and promotion of cooperation in information access. Its main goal was to establish a bridge between information resource developers and information users in diverse subjects (NISSAT, n.d. a).

In addition to those mentioned above, one of NISSAT's objectives is to develop internal linkages among the information industry, its promoters, and its users. NISSAT supported and sponsored development of library networks in India in order to use information technology in libraries and also to promote resource sharing. It sponsored the preparation of union catalogs in science and technology, initiated rationalization of periodical subscriptions, and advanced the concept of universal library access. NISSAT also sponsored creation of subject databases in the subjects in which the Indian contributions and literature are not properly represented. Two of the indigenous databases sponsored by NISSAT are Food Technology Abstracts and Leather Science Abstracts. This program covers the entire spectrum of science and technology. NISSAT activities have strengthened the library movement in India.

NISSAT also worked for the introduction of priced or fee-for-service information services with a motive of meeting the user's demand for high-quality materials and timely provision. It also had close interaction with international organizations such as UNESCO and the Regional Network for the Exchange of Information and Experiences in Science and Technology

in Asia and the Pacific (ASTINFO). Such interaction enhanced international linkages and the flow of information resources. During the period of the NISSAT project, several activities and initiatives were planned and executed. The NISSAT program brought about a number of important changes in information management in India.

Under this program, the major activity has been the development of what were first called Sectoral Information Centres (SICs) and are now called National Information Centres, though they are still commonly called SICs (NISSAT, n.d. b). These centers provide bibliographic, factual, and numeric information as a product to the scientists in the country. Each SIC is supposed to develop information and information sources in a particular or assigned discipline, including micro-disciplines. The sources include both Indian and foreign materials. The centers serve as national bases for information work in their assigned fields and disciplines. They supply copies of documents on request to the users and in turn act as document delivery centers. They also prepare special bibliographies and provide patent search, translation services, and interlibrary loan.

To summarize, the activities of the SICs include the following:

- Preparation of subject bibliographies and union catalogs
- Information retrieval on request
- Selective Dissemination of Information (SDI) services
- Building information on patents, specifications, and standards
- Carrying out surveys, preparation of state of art reports, and scientific and technological forecasting
- Provision of translation, reprographic services, etc.

Modalities for establishing the SICs were:

- Identification of subject area and host institution
- Assessment of relative merits and utility and evolution of collaborative systems
- Upgrading of existing facilities at host institutions to serve the national community of users
- Provision of manpower and relevant training
- Procurement of necessary infrastructure
- Pricing policy for the services

Initially, a suitable host institution was identified to establish each one of the SICs. On the basis of the reports submitted by the experts, as well as availability of infrastructure at the host institution, twelve SICs were established. They are in the following fields:

- Leather technology
- Food technology
- Drugs and pharmaceuticals

- Textiles
- Chemicals and allied industries
- Management sciences
- Marine and aquatic science
- Advanced ceramics
- Bibliometrics
- Crystallography
- CD-ROM

The SICs were supported by the Department of Scientific and Industrial Research (DSIR). Each SIC acted as a national information center in a specific subject and provided all the required information in that particular area. By 2004 the NISSAT project came to an end; however, the host institutions are continuing the centers, and they are being managed with their internal resources.

There was also momentum to establish city- or region-based library networks. NISSAT promoted and tried to provide some financial assistance for developing these networks. They are ADINET (Ahmedabad Library Network), BALINET (Bangalore Library Network), BONET (Mumbai Library Network), CALIBNET (Calcutta Library Network), MALIBNET (Madras Library Network), MYLIBNET (Mysore Library Network), and DELNET (Developing Library Network). Not all of these networks have carried through with plans for network library services (Kaul, 1992). The most active have been DELNET and MALIBNET. So far, DELNET has done the best work among all these networks, including the creation of a database of 5 million records (as of December 2005) and other activities (DELNET, 2005). DELNET is discussed in more detail below.

LIBRARY CONSORTIA

The primary purpose of establishing a library consortium is to share physical resources including books and periodicals amongst members. However, the mode of cooperation has gone under transformation with infusion of new information technology from print-based environment to digital environment. The emergence of internet, particularly the World Wide Web (WWW) as a new media [sic] of information delivery triggered proliferation of web-based full-text online resources. (Arora and Agarwal, 2004, p. 293)

Consortia in India have undergone a transformation with this infusion of new information technology and the movement from a print-based environment to a digital environment. Library consortia are basically formed to use resource sharing as a means of dealing with increased demand for materials and increased cost for information products. Through consortia, libraries are coordinating their purchasing to provide the best quality and quantity of materials to their clientele at a lower cost. Consortium programs

not only contribute e-resources at discounted rates, but they also help to make them available on users' desktops. Consortium purchasing is assisting libraries to deal with the increasing pressures of diminishing budgets, increased user demand, and rising journal costs. With the welcome development of e-journal content, libraries all over the world are forming consortia of all types and at all levels to take advantage of current global networks to promote better, faster, and more cost-effective ways of providing electronic information resources to information seekers.

Looking at the experiences and benefits accrued at the international level, many consortia have been formed in India. Most of these consortia had support from the government either directly or indirectly. These consortia have slowly picked up and have been able to achieve the purpose for which they were established. The objectives for their formation have been similar, although the number and types of libraries and services differ. Some of the more important consortia in India are described below.

Indian National Digital Library in Science and Technology (INDEST)

"The availability of IT-based electronic information products are [sic] exerting ever-increasing pressures on libraries, which, in turn, are committing larger portions of their budgetary allocation for either procuring or accessing web-based online full-text search services, CD ROM products and online databases" (Arora and Agarwal, 2004, p. 293).

Library consortia have been formed to deal collectively with the problems of purchasing online products, to benefit from the best possible volume pricing, and to secure the best terms of agreement from online publishers.

In view of the facts mentioned above, the INDEST consortium was formed in 2003 on the recommendation of an Expert Group. In addition to a financial contribution of Rs 200 million by the Ministry of Human Resource Development (MHRD), the All India Council for Technical Education (AICTE) also contributed Rs 37.5 million to this consortia project for purchase of e-resources (Dr. Jagdeesh Arora, National Coordinator, INDEST, personal communication, May 2005). Formation of INDEST also involved many other departments and ministries such as the Ministry of Information Technology, the Department of Science and Technology (DST), the Department of Biotechnology, DSIR, the Department of Ocean Development, etc. Thirty-eight centrally funded government institutions, including the Indian Institutes of Technology (IITs), the Indian Institute of Science (IISc), the Indian Institutes of Management (IIMs), the National Institute of Technologies (NITs), and a few others, are core members of the INDEST Consortium (INDEST, 2004).

The policy of this consortium is open ended, that is, any institution can join the consortium. Sixty-six government (including government-

aided) institutions and fifty-three private colleges/institutions have joined as members. The membership charges are Rs 1,000 per year. Many engineering colleges have joined this consortium. The private institutions are self supported (contributing Rs 35 million during the year 2004). The members are provided with access to all electronic resources selected by the consortium. Of course, the ministry provides funds only to the core members and government colleges through the consortium headquarters set up at IIT, Delhi. Now the total number of members is 173 (as of December 2005).

The journals subscribed to by the consortium total more than 6,500 from seven databases from various publishers and aggregators. The National Steering Committee has overall responsibility and sets policy, monitors progress, and coordinates with the University Grants Commission (UGC) and AICTE (which is responsible for licensing engineering, technology, pharmacy, and business schools) to promote the consortium. The headquarters manages subscriptions to e-resources. The consortium negotiates the prices and is able to get discounts between 22 percent and 93.01 percent (the average is greater than 80 percent). It is estimated that Rs 221.6 million were saved by all the institutions put together due to purchase of e-resources through INDEST for the year 2005 (1955.8 million rupees [normal subscription]–1734.2 million rupees [actual subscription paid through INDEST]). On the basis of the instructions from the MHRD, INDEST instructed all of its members to stop subscriptions to print resources in lieu of the e-resources available. This has resulted in savings of Rs 91.3 million (Dr. Jagdish Arora, National Coordinator, INDEST, personal communication, May 2005).

The most useful policy of this consortium is that members can choose to subscribe to as many titles as they want. At present, there is no local hosting of resources. They are accessible from publishers' Web sites. That is, publishers' Web sites host search and browse interfaces to locate journals and their URLs. The consortium is also making continuous attempts to identify other electronic resources of relevance to educational institutions and also to get the best possible subscription prices and license terms. It also monitors international developments in this area and liaises with the International Coalition of Library Consortia (ICOLC) to bring the best possible solutions to its members.

Document delivery and interlibrary loan are felt to be very important in this consortium. Therefore, Informatics India Ltd. designed and developed J-Gate Custom Content for Consortium (JCCC) for INDEST members (JCCC, 2003). This is a common, publisher-independent gateway to search and access the journals subscribed to by the consortium. The tables of contents of approximately 4,271 journals from 960 publishers, both print and online, are included in this database.

The JCCC provides the following services:

- Ability to browse the tables of contents of journals
- Ability to search articles by author, title, and keyword across the journals
- Ability to create users' own e-mail alerts for getting tables of contents from their favorite journals
- Ability to send instant e-mail requests whenever users find an article that is not in the user's library but is available in other libraries
- Facilitates generation of automated interlibrary loan requests directly to one of the member libraries; however, at present, these requests are routed through the consortium headquarters (IIT Delhi)

INDEST Extended

The INDEST Consortium would like to take up additional activities related to content creation under a new MHRD initiative called "INDEST Extended." The consortium would like to add the following activities to its existing activities:

- Interoperable electronic submission of theses and dissertations
- Electronic preprint server for all consortium members
- Manual of procedures for management of libraries and information centers of INDEST member institutions
- Web-based union catalog of journals and other serial publications
- Web-based union catalog of books
- Cooperative cataloging of Internet-based electronic resources (Arora & Agarwal, 2004)

Other issues related to INDEST include the following:

- INDEST is organizing training programs for the member libraries (for both users and library staff)
- It is providing consultancy services to the member libraries in library computerization, digitization, and developing computer infrastructure
- It is planning to offer joint computer storage facilities to host archives and back files; these files can be accessed by the members
- In due course, INDEST wants to develop a shared core collection of e-books
- INDEST wants to invite and encourage all engineering and technological institutions in India to be members of the consortium, in order to have continuity and sustainability
- It encourages continuous communication among members, which may contribute to their commitment and cooperation
- An archived mailing list is available to facilitate communication among the members of the consortium

- A user group and user convention have been established for identifying issues and solving problems

Special Interest Group on Management Sciences

A special interest group on management sciences (SIG-MS) was formed in March 2003. The group is called Electronic Resources for Indian Management Schools (ERIMS). At the organizing meeting, Professor Roshan Lal Raina stated that in 1994 a resource-sharing program was started among four IIMs (there were only four IIMs during that period). At that time research found that 62 percent of foreign journals were duplicated among these IIMs. Forty percent of IIM budgets was spent on 10 percent of total subscriptions. The managers of these IIM libraries felt the need for document delivery of print journals and started resource sharing among these libraries. This cooperation led to serious consideration about forming a larger consortium. In 2000 one product was jointly procured to test the concept of a consortium. With formation of INDEST, all the IIMs joined this consortium and formed the ERIMS special interest group. This group suggests consortium-based subscription to e-resources to member institutions dealing with the subject of management (INDEST, 2003).

In the year 2000 the Management Libraries Network (MANLIBNET) was formed to “achieve high standards in Management and Business (M&B) librarianship and Information services in India.” One of the most important objectives of MANLIBNET “is development of strong linkages among the M&B libraries and information centres for resource sharing” (Dr. S. Sangayya, Librarian, IIM, Ahmedabad, personal communication, May 2005). In addition to IIMs, other business schools have joined MANLIBNET. It now holds annual conferences to discuss the trends in information management and issues relating to enhancement of the quality of information services in member libraries.

The INDEST consortium has been managed very well and the services are appreciated. This consortium is trying to continuously develop innovative programs and activities for the convenience of its members. Looking at its effective functioning, more institutions are likely to join consortia of this type.

Council of Scientific and Industrial Research Consortium

The Council of Scientific and Industrial Research (CSIR) is one of the largest government-funded organizations in India, with a chain of thirty-eight laboratories spread across the country. It has an estimated 5,000 active researchers supported by approximately 16,000 technical and administrative staff. It has contributed to research output in various disciplines of scientific and industrial research. As support services, these laboratories have established libraries and documentation centers on their premises and procure all sorts of document sources in support of their work. These laboratories

together spend about Rs 250 million and procure about 3,400 foreign print research journals. These numbers include some duplicates, as the same title may be procured by many different laboratories. The print editions create an annual repository of 5 million articles (Narayana & Goudar, 2004). Regular increases in subscription rates, the decreasing value of Indian currency, increased demand for information, and dwindling library budgets for procurement of journals have caused CSIR laboratories to look for alternatives, such as procurement of electronic journals, extensive use of information technology, and sharing of resources by forming library consortia.

The CSIR labs made attempts to form a consortium in 1993 and 1999. In 1993 the heads of the Libraries and Information Centers (LICs) met and wanted to create an exhaustive bibliographic database covering five disciplines. However, this could not take place. In 1999 an unsuccessful attempt was made to create a Consortium for Materials Science and Aerospace Collections (CoSMAC).

In 2001 the heads of the CSIR-LICs met to consider the pooling of CSIR resources and the forming of a CSIR consortium to share resources in a distributed information environment and overcome the limitations of space and time. As a result of the deliberations, a final report was prepared. On the basis of this report the CSIR consortium was formed, basically to provide access to electronic journals for forty-three centers (including thirty-eight labs and other units).

A budget of Rs 117.9 million was allocated for a five-year plan for the CSIR e-journal consortium, targeting access to over 4,500 journals (Narayana & Goudar, 2004). At present, the consortium has already entered into an agreement with many publishers, such as Elsevier Science, American Chemical Society, American Institute of Physics, and Springer (P. Diwakar, Senior Information Officer, ICT-CCMB library, personal communication, May 2005).

Features of the CSIR consortium include the following:

- Access to e-journals: Four types of models were devised for access to journals. The model varies from publisher to publisher. The model is also based on the number of labs interested in procuring a particular publication. These models are (1) all the journals to all the labs (Elsevier, American Chemical Society, and Springer are giving access to all the subscribed journals to all the centers); (2) all the journals to select labs; (3) select journals to all the labs; and (4) select journals to select labs (the American Institute of Physics uses this model).
- The current print journal subscription should be continued by all the participants. However, the titles can be changed during the period of the agreement.
- Access is IP based. Wherever such facility is not available, ID-based access is provided.

- Unlimited access to all the users. The CSIR paid approximately Rs 70 million to get such access to e-journals during this year (2005). This is in addition to the print subscription amount. The CSIR paid an extra amount of 10–20 percent to the publishers to get access to e-journals based on the type of access needed by the centers (P. Diwakar, Senior Information Officer, IICT-CCMB library, personal communication, May 2005).
- Access to back volumes for a specified period (five or more years).
- Access to the titles added during the contract period shall be given at no additional charge.
- The titles discontinued or merged with other titles during the contract shall be provided with access to back volumes.
- On termination/expiration of the agreement the licensor provides full text on prevalent formats with state-of-the-art archival technology and retrieval software.
- The current agreement tenure runs up to December 2006.
- Facilities to search, browse, view, and download the articles of interest are provided, and their distribution among CSIR labs, centers, and institutes is allowed.

The CSIR consortium has resulted in increased access to the journals by scientists. Previously, researchers devoted time and money to document delivery and to interlibrary loans from sister institutions. The consortium means that these institutions and their researchers benefit from more immediate access through resource sharing.

UGC-Infonet

India has about 310 universities and about 14,000 colleges affiliated with these universities. Approximately 10 million students are studying in these institutions. The UGC is the apex organization and was established under an act of Parliament in 1953. It gives recognition to the universities in the country and makes every attempt to maintain standards in higher education in the country. The UGC is the funding agency for the higher education system. The government of India provides the funds for higher education through UGC, similar to the University Funding Council of the UK.

The universities and colleges were finding it difficult to provide access to relevant information to their users due to limited resources. In the context of more than 10,000 Ph.D.'s produced every year by these universities, the universities were badly in need of support for information sources for its users so that the quality of education and research could be improved. Further, the journals procured by these universities were duplicated, and there was no formal understanding between them for resource sharing. Resource-sharing activity was totally localized, informal, and minimal. Even individual universities were finding it difficult to share resources between

different departments due to the distance between departments and department libraries on campuses.

Many universities also did not have the necessary information technology (IT) infrastructure and networking facilities, unlike premiere institutions such as the IITs and IIMs. As an apex organization, the UGC was forced to work out strategies for providing increased access to information. It became more essential in the context of increased quality consciousness and competition from foreign and private institutions. As a backdrop to this situation, the UGC planned and established the Information and Library Network (INFLIBNET), which is supposed to take care of networking libraries and their resources in the higher education institutions across the country. This was established along the lines of the Joint Academic Network (JANET) in the UK.

INFLIBNET has initiated several projects. It collected the bibliographic data from various universities to create a union catalog. It also developed a library management software called SOUL (Software for University Libraries), which is being made available to academic institutions at a nominal rate of Rs 15,000 (that is, \$330) for a single user and about Rs 50,000 (about \$1,100) for the Local Area Network (LAN) version. However, INFLIBNET services are not at the expected level of satisfaction for the academic community and students.

Looking at the information needs of the users of academic institutions, the UGC has launched two ambitious programs: UGC-Infonet and UGC-Infonet e-Journals Consortium. It was difficult for the universities to raise the necessary funds to develop the network infrastructure. Therefore, the UGC-Infonet project, in collaboration with Education and Research Network (ERNET), has provided the infrastructure and also upgraded existing networks to broadband. This network initially connected a select 130 universities on a turnkey basis. They also have plans to use VSAT technology to facilitate networking for both urban and rural universities. Over a period of time, this service is planned to extend to other universities and colleges. INFLIBNET will coordinate between ERNET and the individual universities. Further, INFLIBNET maintains one print copy of almost all the journals subscribed to as a national archive (Murthy et al., 2005).

UGC-Infonet E-Journal Consortium

In the process of improving the quality of higher education, the UGC decided to subscribe to e-journals and provide access to Indian universities and colleges. While procuring these resources, it wants to avoid duplication of procurement of the same titles by the universities as well as bargain for the best subscription rates. Initially, the UGC had subscribed to almost 2,000 e-journals, eight databases, and two portals. Through this project, the e-journals were procured with a discount of between 60 and 90 percent, and access to archival materials was included. The total budget for this project

was allocated by the UGC. In due course, the UGC may collect subscription fees from individual universities.

With the provision of the network infrastructure, the UGC was able to provide access to e-journals. Initially, connectivity was provided to fifty universities starting on January 1, 2004, on a trial basis. It was extended to another fifty universities for the year 2005. Provision of access to e-journals is basic, but more important issues are users' acquaintance with the technology and provision of training to the users to enable them to make optimum use of the resources. Even though the e-resources provide easy and fast access for users, many universities still lack campus networks, resulting in limited access to these resources. Some of the universities still depend on dial-up Internet facilities. However, these days, universities are building improved infrastructure that will enable access through leased lines (IP-based access).

This consortium has improved access to an increased numbers of journals. It has provided the facility for users to directly download information. However, user statistics for the first six months, from January to June of 2004, are not so encouraging. INFLIBNET has received statistics from some of the publishers, and they indicate that the total number of downloads by the member universities was 305,530, out of which American Chemical Society (ACS) journals constituted 37.65 percent. The latest statistics were not yet available but indications are that there is considerable increase in downloading by the users, due to awareness programs and seminars conducted by the universities and by INFLIBNET (Murthy et al., 2005).

It is worth mentioning that a J-gate portal is being procured by UGC-Infonet. It lists about 14,000 journals, both free and subscription based. The user can get access to full-text articles in free journals through a hyperlink. The list is being updated and more and more titles are being included.

A data center with server and storage facilities for content of common interest is being planned for the UGC-Infonet center. The universities can host their Web sites through this data center. An informatics lab was opened at the INFLIBNET center with state-of-the-art technology including wireless technology. This lab is open to faculty and scholars from various universities in the country; there is also provision for supplying photocopies of print journal articles.

INFLIBNET is also building a database of Ph.D. theses submitted to Indian universities. Even the Vidya Nidhi project based at the University of Mysore is in the process of creating a database of Ph.D. theses with financial support from institutions such as NISSAT. It may be worth mentioning that the UGC has already initiated steps for creation of a full-text database of Ph.D. theses presented to Indian universities. It prepared norms for creation of an Electronic Theses Database (ETD). The main purpose of this initiative is to provide free and unlimited access to these theses. However, implementation may take more time.

ICICI Virtual Information Centre

The Virtual Information Centre (VIC) was established at the ICICI Bank Knowledge Park, in Hyderabad, and funded by NISSAT. This VIC was basically established to create e-content and to provide information service and knowledge networking. The VIC formed a journal consortium with seven member institutions, namely VIC, University of Hyderabad, National Institute of Nutrition (NIN), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Centre for Cellular and Molecular Biology (CCMB), Indian Institute of Chemical Technology (IICT), and the National Chemical Laboratory (NCL). Out of these, six institutions are local. This consortium's emphasis is not on subscription to journals but on the optimization of the use of electronic journals. The members share the resources, and VIC acts as a facilitator and fund provider (ICICI Knowledge Park, 2005.). The VIC has entered into an agreement with the service provider (Informatics India Ltd., Bangalore), who creates databases and hosts them on a central Web server with a suitable search mechanism. The end-users from these participating institutions can use the service from their desktops through the Web browser. They can place interlibrary loan (ILL) requests and search databases prepared by the VIC. The advisor for this consortium feels that it could create an awareness of need for consortia, and it has also created innovative initiatives. But he also feels that the experience is not entirely a good one, as the participating institutions have not been showing much enthusiasm and are reluctant to put in any extra effort. The participating institutions need not be blamed as they have their own staff problems and are also involved in many cooperative activities. This program has been operational since 2002 and initially was planned as a three-year project (ICICI Knowledge Park, 2005; Dr. P. Vyasa Murthy, Advisor, ICICI-VIC, personal communication, May 2005).

DOCUMENT DELIVERY SERVICE

It is a common practice for Indian libraries to provide interlibrary loan and document delivery. However, due to several factors, such as frequent delays in the return of documents by the users and the high costs and concern about the safety of the documents, in practice ILL service is not frequently provided by many libraries. Document delivery, on the other hand, is helping to bridge the gap between the have and the have-not libraries. It is being widely used to facilitate user access to required materials.

It is worth recognizing that network technology made it possible for document delivery services to operate at a much faster rate. In the days before networks, document delivery was time consuming and not very economical. Therefore, the services were not very popular. That has now changed. The educational background and technical access of users affect how they access information. In many institutions, especially in developing and underdeveloped countries, the use of online journals is still limited. The ability to find content online, either Internet resources or library resources, depends

upon the ability of the user to use the technology. Many users are still not familiar with online searching. Therefore, online and paper document delivery is mainly restricted to journal articles, and it is one of the most useful and popular services being provided by the libraries. Document delivery services in India are well organized and institutionalized.

Documentation Centers

Several national- and regional-level documentation centers have been established in India. They include the National Institute of Science Communication and Information Resources (NISCAIR)—NISCAIR itself was formed from two institutions: INSDOC (Indian National Scientific Documentation Centre) and NISCOM (National Institute of Science Communication), which were merged to form NISCAIR in 2002—NASSDOC (National Social Science Documentation Centre); SENDOC (Small Enterprises National Documentation Centre); DESIDOC (Defence Scientific Information and Documentation Centre); and CORD (Centre on Rural Documentation). These centers develop collections in their fields and provide documentation services to various institutions and individuals. One of the major services provided by these centers is document delivery. They also provide training to develop staff practices.

NISCAIR NISCAIR's library is the National Science Library of India. This center is supposed to take care of the information interests of scientists in the fields of science and technology. The major objectives of this center are to provide formal linkages for communication among the scientific community in the form of research journals in different areas of science and technology and to collect, collate, and disseminate information on plant and mineral wealth and the industrial infrastructure of the country. This center also provides document delivery to all the scientists and academics in the country and provides several services such as selective dissemination of information (SDI), in addition to the provision of content pages and document delivery. It also organizes both short- and long-term training programs to improve the skills of the staff members involved in information handling.

NASSDOC NASSDOC was established by the Indian Council for Social Science Research (ICSSR). This center procures and disseminates information in the social sciences to all the social scientists in the country. It acts as a clearing house in the social sciences. Services are provided to everyone without any restriction on the institution or type of user. Services include photocopying, indexing, content page supply, and document delivery. NASSDOC also procures copies of the Ph.D. theses submitted to Indian universities in the social sciences.

SENDOC SENDOC is a national documentation center that develops a collection useful for small industries in the country. It was set up by the National Institute of Small Industries Extension and Training Institute (NISIET).

It provides services such as SDI, technical enquiry services, indexing services, and document delivery to needy users. However, SENDOC has currently restricted its collection and services to the parent institution, NISIET.

DESIDOC DESIDOC was initially established as the Scientific Information Bureau (SIB) in 1958 and was reorganized and renamed as DESIDOC in the year 1967. This center provides information and documentation services to the scientists working in the Defence Research and Development Organization (DRDO). DESIDOC works as a central agency providing library and information services to various defense laboratories established in the country (in addition to the individual libraries of each lab). It established the Defence Science Library (DSL), which acts as a central library of DRDO. DESIDOC has developed a good collection of reports and literature useful to the researchers. It also prepared a database of profiles of the defense scientists to better enable the provision of SDI services, and it developed various other databases useful for various defense labs. One of the main services provided by this center is document delivery.

CORD CORD was established by the National Institute of Rural Development (NIRD). Its focus area is rural development. This center acts as a clearing house in the area of rural development and as a referral center. It provides Current Awareness Service (CAS), SDI, reference services, literature searches (database searches), and training and document delivery. CORD also prepares indexes and digests and provides alert services.

INFLIBNET Document Delivery Centers

UGC-Infonet is a boon to academic institutions, but this facility does not yet satisfy all the demand from users. To overcome this problem, INFLIBNET identified six universities that have good collections (both macro and micro literature) and infrastructure. The libraries of these universities have been recognized as document delivery centers. These libraries provide document delivery on demand to the academic community in the country at nominal charges.

The location of the libraries helps to provide access to document delivery services to researchers working anywhere in the country. The increased communication facilities are an advantage to the universities. The six universities are the University of Hyderabad, Banaras Hindu University, Punjab University, the Indian Institute of Science, Jawaharlal Nehru University, and Tata Institute of Social Sciences. Each of these libraries is supposed to take care of a specified region for document delivery service, but it is not mandatory that it only serve that region; users are free to use resources from any library. However, these libraries are independent and deal directly with the users. In addition to these six libraries, the INFLIBNET center also provides document delivery services to the academic community. As a first step, the users need to know what is being published in their subject area—only then can they request document delivery. To increase user

awareness, INFLIBNET has also introduced services such as Contents of Periodicals in Science and Technology (COPSAT) and bibliographic information services. These services have become the basis for document delivery through INFLIBNET and the six specified libraries.

It may be worth mentioning that several other informal linkages have been established among libraries irrespective of the type and location of the libraries. Several union catalogs have been prepared at local, regional, and national levels to be used to facilitate document delivery services. However, these union catalogs are not updated and in turn their use has become more or less minimal.

DELNET

DELNET (Developing Library Network) provides extensive interlibrary loan and document delivery services to member libraries located in various parts of the country. This is one of the most popular services provided by DELNET. Books are sent to the libraries by courier with charges being paid by the borrowing library. DELNET also provides photocopies of journal articles both to libraries and to researchers at institutions, with email notification to users. Requests are received and registered through mail, fax, or any other manner. As of December 2005, DELNET has 950 members located in India and South Asian Association for Regional Cooperation (SAARC) countries, with a very limited number in other countries (3 in the United States, 1 in the United Arab Emirates, 1 in the Philippines, and 2 in Oman). The members are from various types of libraries and deal with a wide range of subjects in the social sciences, humanities, and science and technology. As an example of document delivery provided by DELNET, KLN College of Engineering borrowed 400 books from DELNET during 2004 (Ms. Sangeeta Kaul, Senior Information Officer, DELNET, personal communication, June and December 2005).

DELNET has developed a library management software system called DELPLUS (the present version is 2.0-LAN version). It is provided to the members at a nominal cost of Rs 15,000 (approximately \$330). DELNET also organizes orientation programs to popularize its services. It provides training in the creation of bibliographic records with MARC 21, and it provides DELDOS software free to all its members.

INTERLIBRARY COOPERATION

Interlibrary cooperation is local cooperation between two or more libraries. This cooperation may be formal or informal. Cooperation mainly involves resource sharing. Local cooperation has been necessitated due to alarming shortages of financial resources in many institutions. Smaller research and academic organizations are unable to procure information resources to satisfy their users' needs; in turn, the lack of access to such information will have a negative effect on research. A number of industries

established in the country cannot afford to purchase a single database or secondary source. The situation is similar with many colleges offering both undergraduate and postgraduate courses.

The situation is mainly due to limited government support to these small industries, research organizations, and academic institutions. But the contribution of each and every organization is likely to help national development and exports. In this context, the large institutions want to help needy organizations but find it difficult to allow everyone to make unlimited use of their documentary and informational resources. It may directly affect access to information by their own users, and use is also subject to publishers' conditions. Further, allowing outside users also creates security and safety problems. In this situation, a balance must be arrived at that is beneficial to both the organizations. The thinking on helping the less advanced organizations has its roots in a NISSAT project. Under this project, library tickets (cards) were issued to many institutions and organizations allowing them access to the library facilities of government or government-sponsored institutions at a nominal charge. This scheme was successful. The concept of mutual help and resource sharing has become an accepted norm in most Indian libraries.

Every library wants to generate financial revenue as well as support resource-sharing activity. Now, many larger institutions allow smaller institutions' users to make use of their libraries at nominal charges. These charges may vary based on the background and size of the organization seeking the services. The IICT-CCMB library (two laboratories have a common library premises) spends almost Rs 26 million per year on library acquisitions, and the research output of these labs is recognized as the best in applied chemistry and modern biology. It allows users from both academic institutions and industry. It gives free access to library resources to doctoral students from other universities. It has categorized industries into three categories and charges them Rs 50,000, 25,000, and 10,000, depending on the industry, generating an annual income of Rs 1.6 to 1.7 million (P. Diwakar, Senior information officer, IICT-CCMB library, personal communication, June 2005). Institutions are provided with one library card and on request an extra card is provided for a payment of Rs 5,000.

The Central Institute of English and Foreign Languages (CIEFL) allows all the students and researchers from any academic institution to use their library for a nominal payment of Rs 150 per three-month period. The National Institute of Nutrition (NIN) library is permitting free use of its resources on any working day during office hours. At present many students, especially from pharmacy colleges, and the industries use this library facility. Osmania University Library permits the users to use their doctoral theses collection for a nominal payment of Rs 50 per day.

According to the MALIBNET annual report of 2004–05, it has prepared a directory of current serials in Chennai (Madras) for the year 2003, which

includes 4,500 titles. One of the best resource-sharing activities of this network is the MALIBNET Card Service. Under this program, MALIBNET issues cards that permit the card holder to visit the member libraries for consultation. Access is free to all members. To date it has issued 500 cards. It has further plans to make its database accessible through the Web and also to provide e-journal resource-sharing facilities. A similar card system was introduced earlier by NISSAT (*MALIBNET Annual Report, 2004–05, 2005*).

Several organizations provide funds for projects, and many library scientists are involved with projects that are useful to their users. A teacher from Aligarh Muslim University devised a gateway to library and information resources (Library and Information Science Gateway, 2005). It is freely accessible but it is not regularly updated. The Documentation Research and Training Centre (DRTC) of the Indian Statistical Institute has developed a digital library in library and information science (DRTC, n.d.) and also a digital library gateway for LIS journals (Indian Statistical Institute, 2005). The contents are freely accessible.

Similarly, many libraries have been opened up for use by the public. This aspect of resource sharing has created a major problem of damage, and pages are being cut out by some mischievous users. Some libraries have started installing security systems in their libraries to stop pilferage of documentary resources. However, these security systems may not stop the cutting out of pages. The current feeling is that access to resources for the public is needed. It helps in national development and productivity. Currently the feeling among needy users is that since most libraries with good collections are publicly funded, directly from the government or through its agencies, these libraries should make their resources available to all users on a par with public libraries. Of course, this concept is yet to be recognized or accepted by all organizations. But, it is a fact that almost all libraries have become much more open in providing access to their resources to outsiders (except the libraries of defense or sensitive organizations). Previously, the libraries were almost closed to outsiders, and now they are allowing outside users. The access to outside users is either for a nominal payment or free. Due to limited infrastructure, certain restrictions are being imposed on outside users.

CONCLUSIONS

There is a transformation taking place in the attitude of Indian institutions toward sharing of their library resources. All libraries are feeling the pinch of limited resources in the context of increased user demand for information. The experiences of libraries in other countries (especially from developed countries) and their resource-sharing programs have given impetus to Indian libraries to plan for resource-sharing activities with an open mind, which in turn is helping to meet the demands of the users to

a limited extent. The major problem for libraries has been limited funding. Involvement of the scientists and academics has helped to deal with the problems faced by libraries. The experiences of scientists in accessing information have caused them to initiate and put forward several proposals to the government for funding the acquisition of library resources. They have put in a lot of effort to convince the government and its agencies of the need for funding. These efforts will hopefully result in additional funding as well as in the sponsoring of various programs related to information dissemination, including funding for consortia programs.

The establishment and funding of several library activities through NISSAT has created momentum for the use of information technology for library development. Facilities have been improved to enable increased access, and there has also been an increase in the number of information resources for users. The training of users and professionals has become part and parcel of every library activity. The training must include not only internal staff but also be extended to other institutional staff. Training is an important component of many organizations' development, especially for the national-level organizations. Since technology-based programs have been innovative and new, the training programs have been important to enable both the users and professionals to become acquainted with new resources and methods. Staff and users are being trained to make use of the resources at their institutions and resources subscribed to under consortia programs. Thus, the training is becoming a continuous activity for members of consortium institutions. In addition to these programs, NISCAIR organizes short-term and long-term training programs for both Indian and SAARC participants. The short-term training programs (two to six weeks) are free for participants. INFLIBNET organizes programs for staff of various academic institutions in the automation of libraries, the use of e-journals subscribed to under consortia programs, and the development of databases. INDEST organizes programs for members in the handling of Web resources.

Resource-sharing activity in Indian libraries has mainly been limited to sharing of information and human resources. It is a matter of concern that the methods followed by libraries are very different from one another. No standard procedures have been followed, even by similar types of institutions. Due to this, several resource-sharing programs such as the sharing of cataloging data or database keywords have not been possible. For example, no one has taken the initiative to create an acceptable standard for a catalog format in India. The Bureau of Indian Standards has created a standard but many libraries are not even aware of this, and the standard now needs to be updated. Many university libraries, public libraries, and special libraries procure the same books, and they are being cataloged independently with local variations. There is no sharing of cataloging data among these libraries. Everyone knows that libraries are wasting a lot of effort cataloging the same books repeatedly, which may be in the same library system or

other systems. Most libraries are now downloading cataloging data from the Library of Congress catalog through the Internet. Some members of the Online Computer Library Center (OCLC) download from WorldCat. There is an Indian National Bibliography, and there are many other databases developed by other agencies such as INFLIBNET or DELNET. However, one finds that entries from these are either not downloadable or they do not follow a standard format. This is one of the most important areas where resource sharing is needed. The national-level organizations need to take up the creation of a national database with regular updates, which can be used for downloading catalog data by other libraries.

There is a need to seriously consider the formation of a national consortium by merging or combining all of the consortia programs. Most of these consortia are being funded by different government agencies; perhaps they could be formed into a national consortium so that e-journals and e-documents could be subscribed to with even better terms and discounts than what is being offered today.

It may be worth stating that recently, the Indian Parliament Library has opened its doors to the researchers, which is a landmark development in knowledge-sharing activity in India. Until now its valuable collection was accessible only to parliamentarians and government. Now researchers can access these valuable information resources. This step is likely to encourage and pave the way for other libraries to follow the footsteps of the Parliament Library, which will go a long way in the knowledge-sharing movement in India.

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